EC1838B Welding Course for Electronic Clock Set

Please read this welding course carefully, according to the course welding can improve the success rate of welding!!!

目录

I. Tool materials to be prepared before soldering

1. Electric iron

Electric soldering iron is a necessary tool for soldering. The soldering temperature should not be too high during soldering, and electrostatic protection should be done well, otherwise components are very easy Damaged.

Here we recommend use constant temperature soldering iron.As shown in the following figure :



The author uses this kind of soldering iron to weld. The temperature should be about 330 degrees. If it exceeds 350 degrees, it will increase the risk of welded components damaged . If there is no constant temperature soldering iron, it is OK to use 30W low power soldering iron. In short, the welding temperature should not be too high!

The welding time of each pin should not be too long, and the effect of too long time will burn the components as well as adjusting the temperature high. Usually a pin can be welded in two or three seconds.

Another is to do a good job of static electricity protection!!!

2. Tin solder

In addition, we remind you not to use flux, rosin, solder paste and other auxiliary soldering materials. According to author's years of experience have shown that all kinds of strange problems can easily arise when using these things. The circuit board of this kit has been added with tin spraying technology, and there will be no tin-free situation, you can rest assured.

3. Diagonal pliers

Inclined tongs are used to cut off the excess pins of components. Of course, as long as you can cut the pins of the components, you don't have to buy this one, as the picture shown below:



4. Multimeter

Multimeter is a necessary tool for testing components and checking circuit faults. When a soldering is successful, it may not be necessary, but when it is unsuccessful, it should be carefully checked. So it's better to have one Is there any recommendation? Yes! If you really don't know which multimeter to use, I recommend the following one. The main reasons for recommendation are high measurement accuracy, automatic range and convenient measurement. The only disadvantage of this multimeter is that it's a little expensive.



5. **Other tools**

It seems that the there would not any other tools to weld this kit. You can prepare whatever you feel you lack (Haha!!!).

II. Understanding the Components in the Suite

The following pictures are taken in kind by the author . There may be some color difference between the pictures you receive . Because of the difference of manufacturer or batch, there may be some difference in appearance and shape. At this time, the material you receive should prevail.

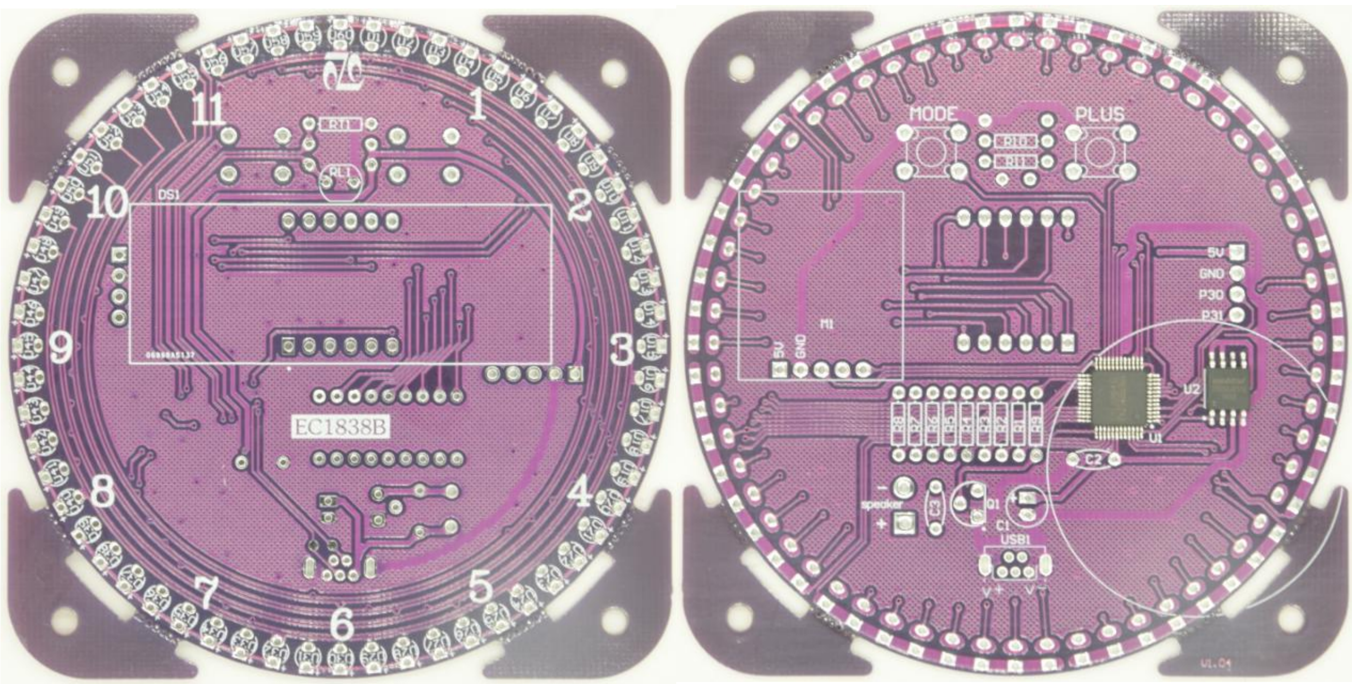
To know the components in the package is a prerequisite for successful welding, so please pay close attention to content of this chapter. Let's start to learn with a list of components for this suite:

number	Component name	Specifications	Identifier on PCB	quantity
1	PCB	81*81*1.6mm Violet		1
2	Clock module		M1	1
3	Nixie tube	0.56 inch 4-bit common positive nixie tube	DS1	1
4	LED	3mm Direct insertion	D1~D60	60
5	resistance	1/6W 470Ω Metal film resistance	R1,R2,R3,R4,R5,R6,R7,R8,R9	9
6	resistance	1/6W 20KΩ Metal film resistance	R10,R11	5
7	Electrolytic capacitor	16V100uF ±20% 5*7 Direct insertion	C1	1
8	Monolithic capacitor	104 Direct insertion	C2,C3	2
9	photoresistor	5506	RL1	1
10	Thermistor	MF58	RT1	1
11	Triode	S8050	Q1	1
12	USB socket	Mini-USB 180 degree Direct insertion	USB1	1
13	key	6*6*14mm	S1,S2	2
14	loudspeaker	8Ω2W		1

Next we let we know the components in the list through photos.

1. Circuit board

The specifications of the circuit board are as : 110mm*34mm*1.6mm purple.
The following pictures is the PCB board taken on the front and back, respectively:



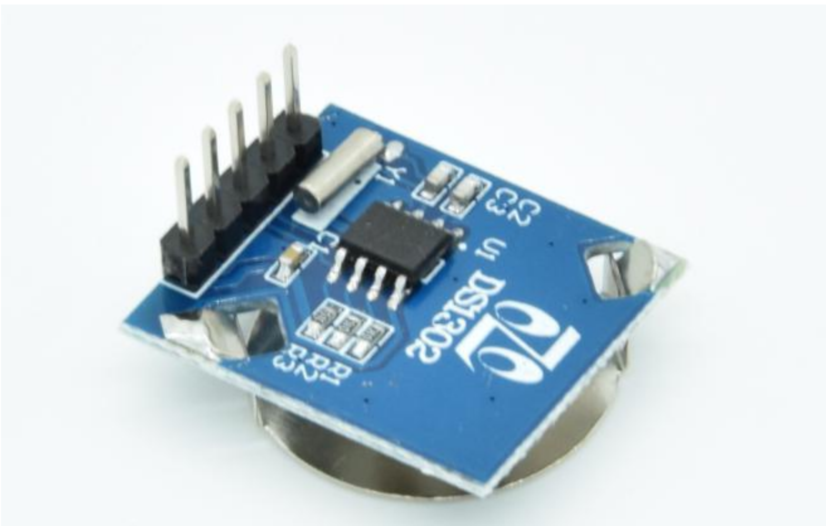
U1 and U2 have been welded on the board. These two components are MCU and memory chip respectively. Because these two are SMT Packaging Components, and pins are relatively tight, for those who are not skilled in welding technology, might not succeed in welding, So we welded it in advance.

2. Electric clock module

There are two kinds of clock modules for you to choose from. If you buy the DS3231 version, the clock module as follow：



If you buy the DS1302 version, the clock module as follow：



The picture Below is stands a battery for the clock module. The model is CR2032 (front on the left and back on the right). One side of the'+'is the positive pole：



After soldering, the batteries should be put into the battery base on the front of the module. The negative electrode contacts the PCB plate and the positive electrode contacts the metal sheet. Never pretend to be contrary!!!

When it is found that the clock can not save time after clock power off, it is very likely that the battery is power off , you can measure it with a multimeter, if the Voltage below 2V it means need to change a new battery.

3. Nixie tube

This kit uses a 0.56 inch digital tube. The nixie tube has four colors: red, green, blue and white. Before it is lit, all three colors look like the following figure. The color can be identified by the model printed on the nixie tube. The red color is 5463BS, the green color is 5463BPG, the blue color is 5463BB, and the white color is 5463BW. Of course, the model printed by different manufacturers may be different. The best way is to light it to see the luminous color directly.



4. Resistance

This kit uses 1/6W metal film color ring resistance. The color ring above the resistance represents the resistance value. If you do not understand the color ring, please use a multimeter to measure the resistance value. The following picture:



5. Electrolytic capacitor

The electrolytic capacitor is divided into positive and negative electrodes. The white side of the capacitor is negative electrodes. When the pins are not cut out before, the lead of the negative electrodes is relatively short. Following chart ：



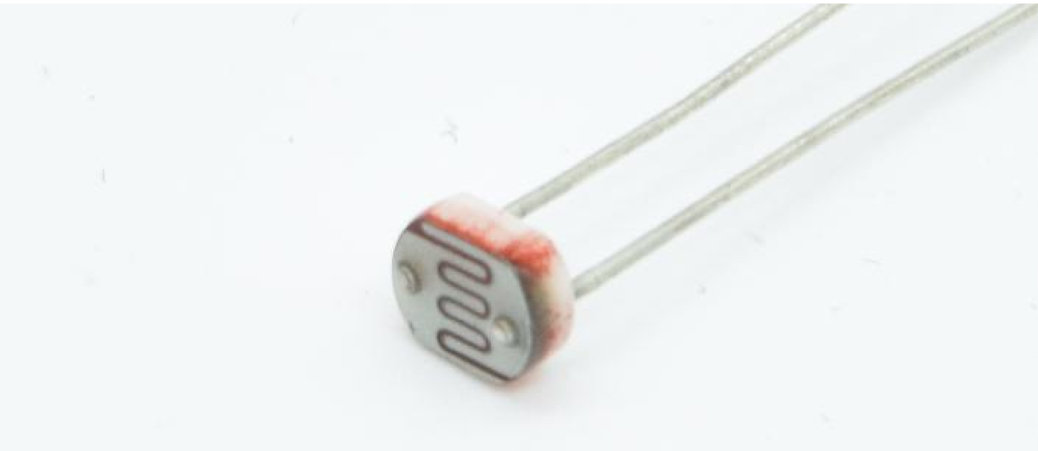
6. **Monolithic capacitor**

Monolithic capacitors are no need to distinguish positive and negative. The upper label 104 indicates that the capacitance of the capacitor is 0.1uF. Following chart ：



7. **photosensitive resistance**

The following picture is a photoresistor. Its name shows that when there is light or no light, its resistance value is different



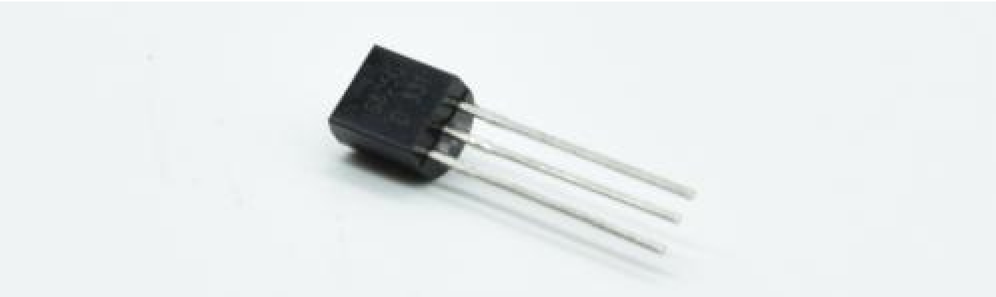
8. **Thermal resistor**

The following figure is a thermistor, which of course changes with temperature. It should be noted that the volume of thermistor is relatively small, we should pay attention not to drop it!



9. Triode

The Triode model is S8050.



10. Mini_USB socket

Specification: Mini_USB 180 degree direct insert.



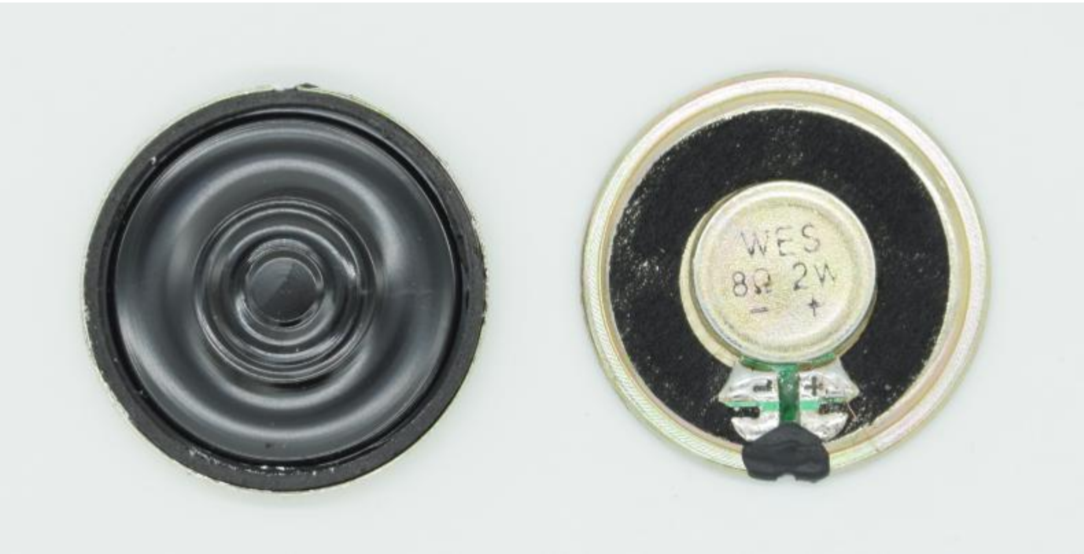
11. Key

The specifications are 6*6*14 mm.



12. loudspeaker

This kit use a 8Ω 2W small speaker which diameter is 36 mm. Interested users can measure it with a multimeter. The internal resistance of the horn is really about 8Ω. The actual picture below is on the left and on the right is the back.



13. Power line

The power cord powers the clock. The USB cable with Mini-USB interface is adopted.



III. Step-by-step welding of electronic clock

Please be sure to follow our tutorial step by step welding, thank you for your cooperation.

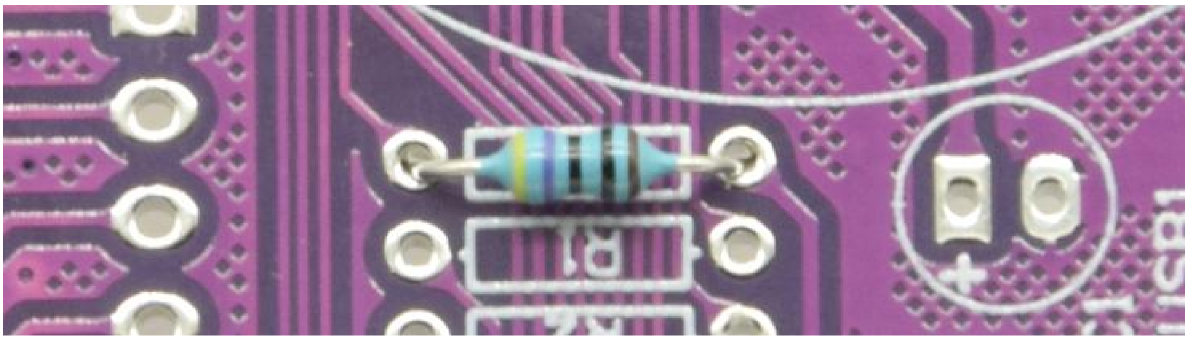
If you have not welded yet before, you can see an article which I found on the internet- "Electronic Components Hand Welding Technology and Processing Requirements". The basic operation of welding elements is introduced above. If you don't know welding, please study carefully.

Next, I will not introduce how to weld any more. I will show the effect of welding directly.

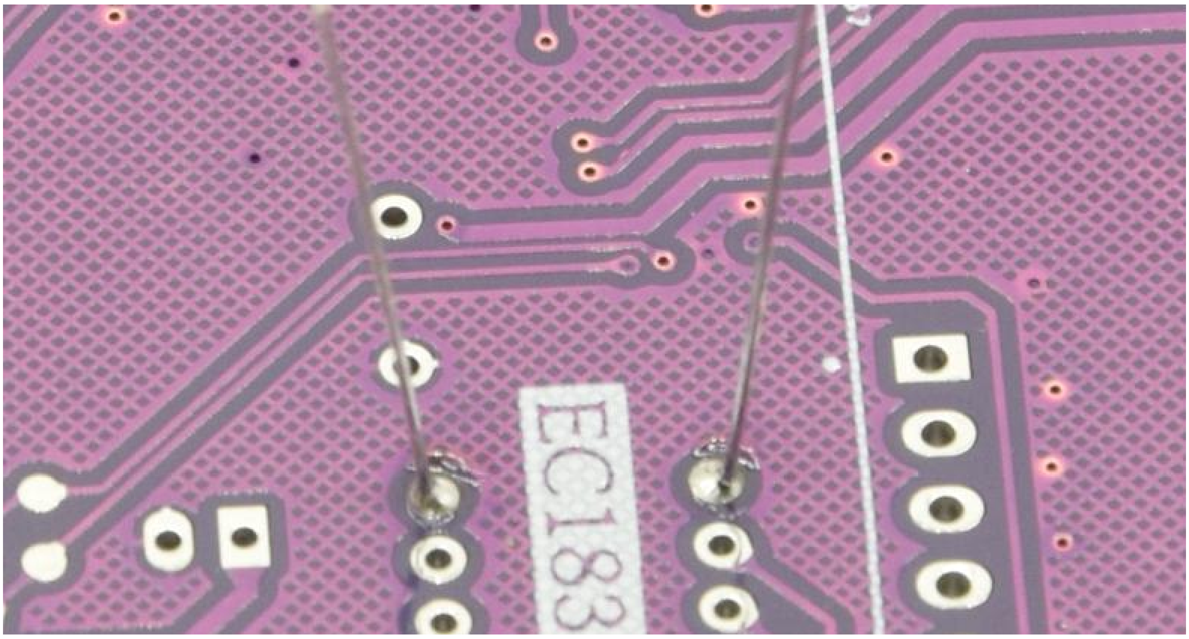
1. Weld resistance firstly

There are two kinds of resistors in this kit. 470Ω resistance is welded in the positions of R1~R9 and 20 K resistance is welded in the positions of R10 and R11.

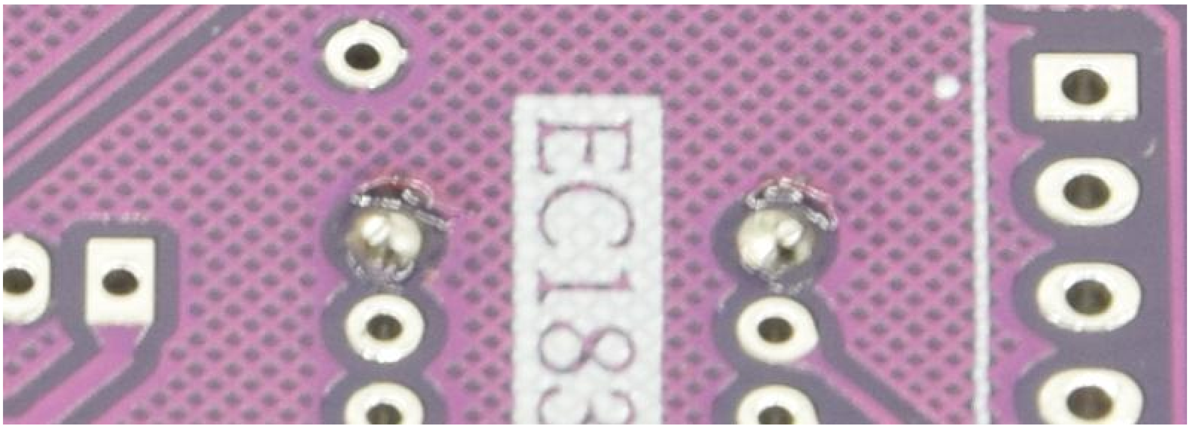
The components need to be welded one by one. First, we weld R9. First, we insert a 470Ω resistance into the position of R9 on the circuit board to make the resistor body close to the circuit board. As shown in the following figure:



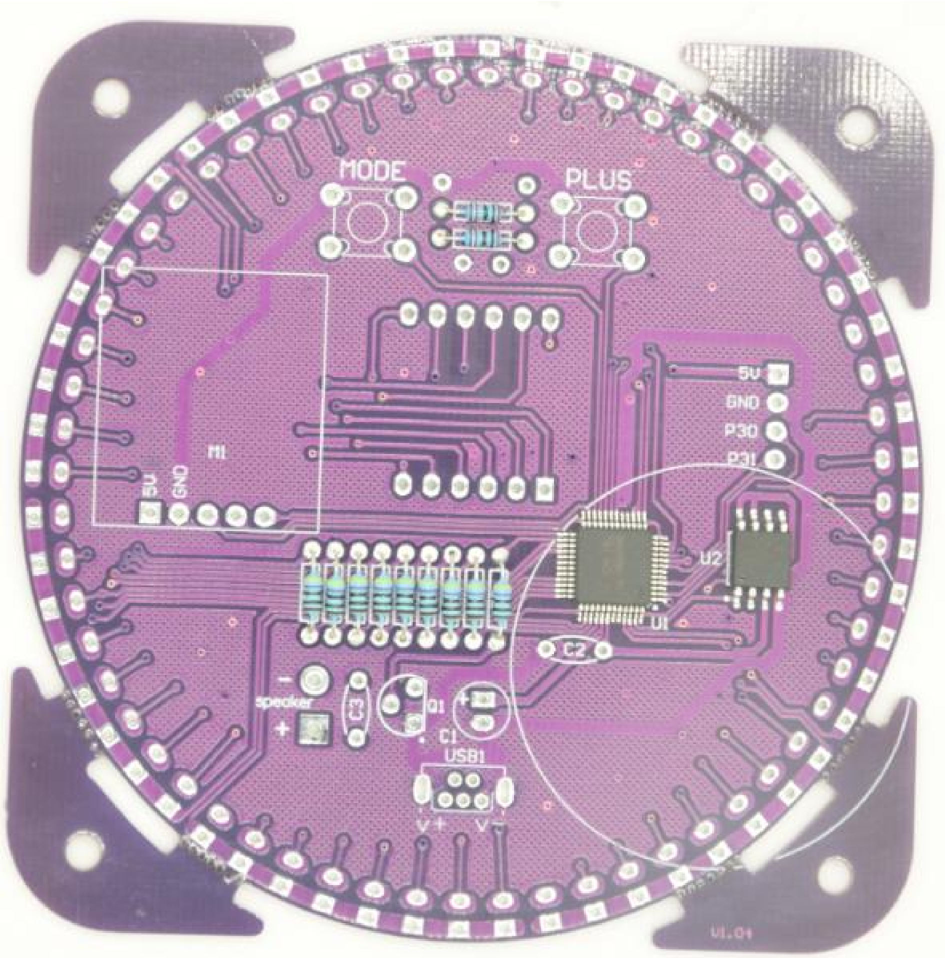
Weld the resistance well on the other side, and pay attention not to false welding, as follows：



Then cut the unnecessary pins, and after cut the pins it shows as below：



So far, a resistance will be welded, is it very simple? In fact, for the straight-plug components are so welded, but there are some pins short and no need to cut pins short. Next just weld the remaining resistors. After welding, the effect is as follows:



2. Welding LED

Why the second step is to weld the LED first, because the LED is placed on the front, welding on the back, if welding other components on the back, it may affect the welding of the LED It should be noted that a small number of LED welding is in the position of the whole point and the rest of the positions are welded to another LED.This tutorial takes the combination of red green (red quantity and green quantity) as an example.

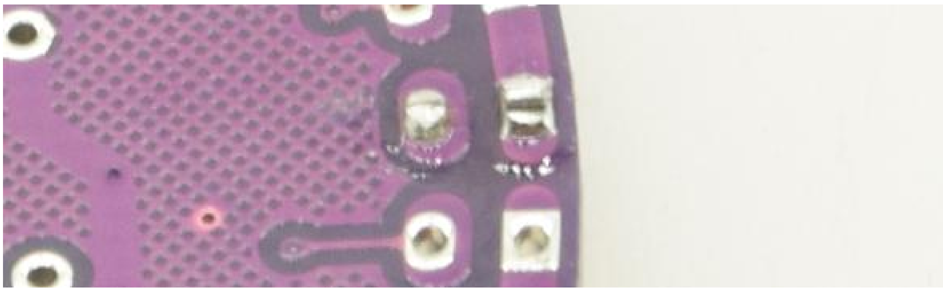
LED is also one by one to weld, first insert the LED into the board, pay attention to the positive LED inserted into the number of "+" pad. as follows:



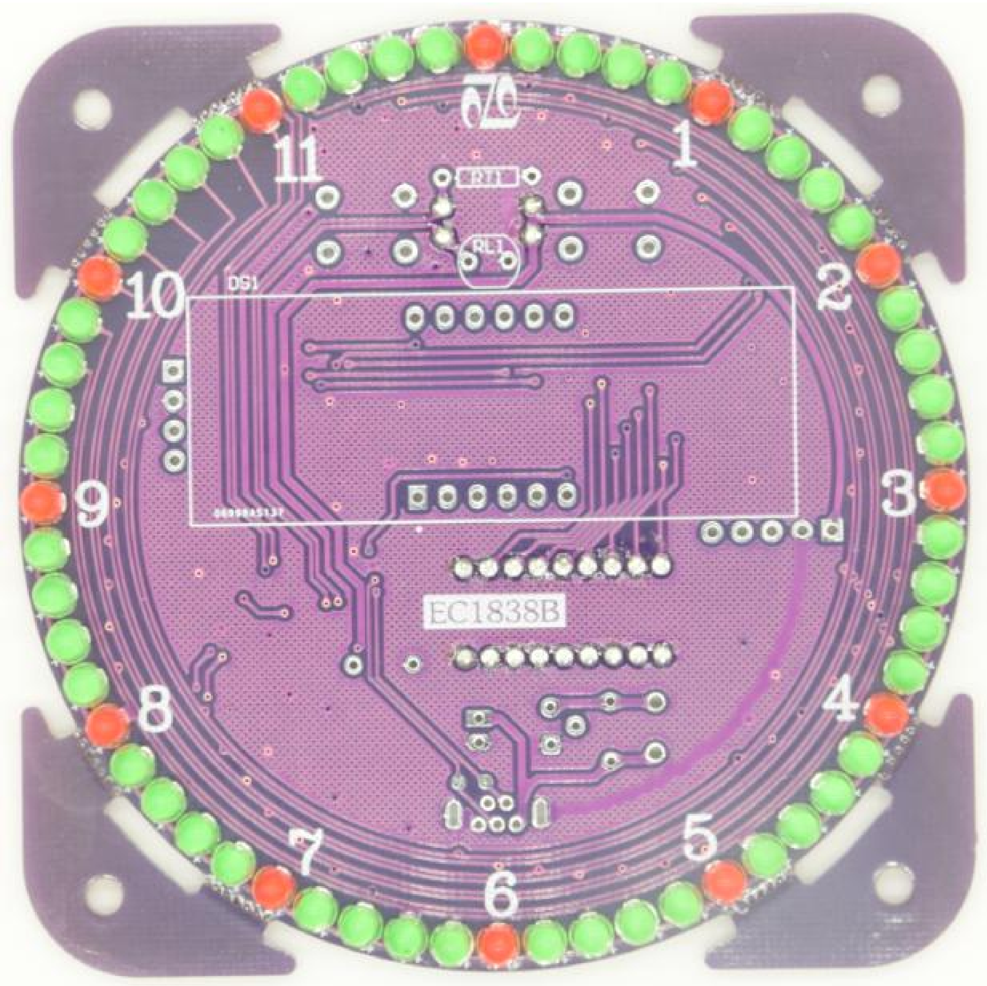
Then weld on the other side, as follows:



Cut the pin again, as follows:

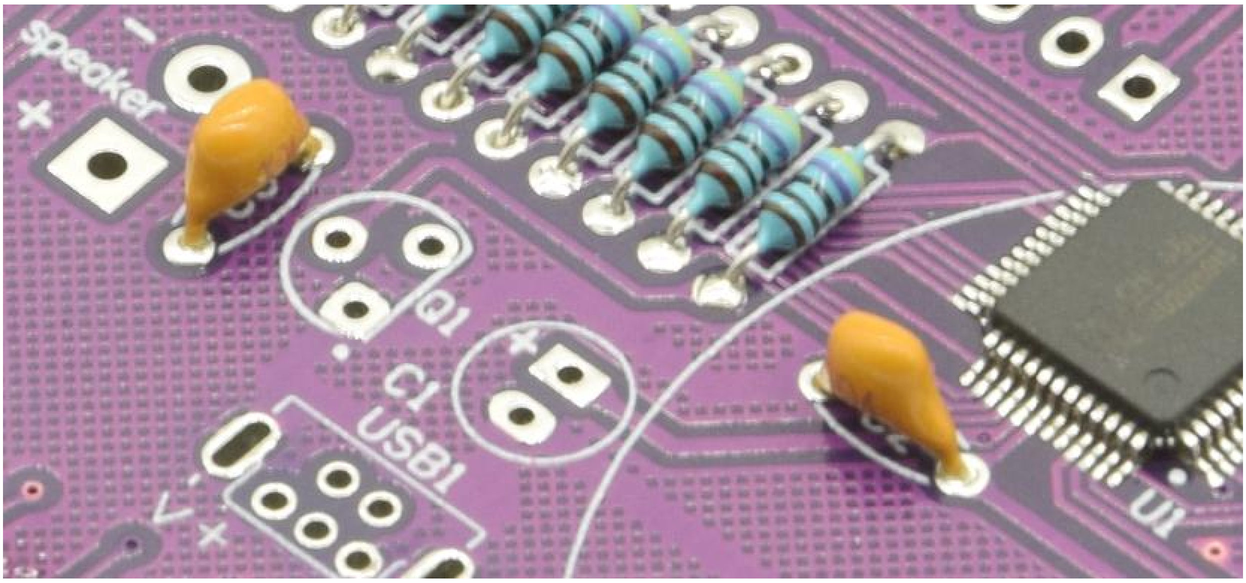


According to this procedure, LED will be welded one by one, and the effect will be as follows:



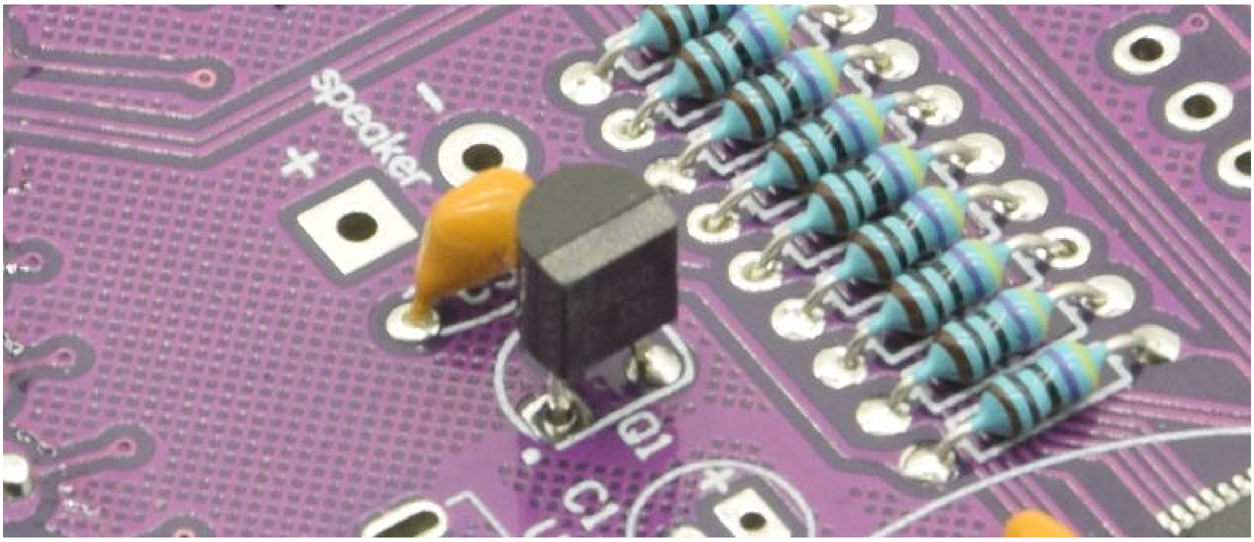
3. **Welding monolithic capacitor**

The single stone capacitor is welded in the position of C2 and C3. After welding, as shown in the following figure:



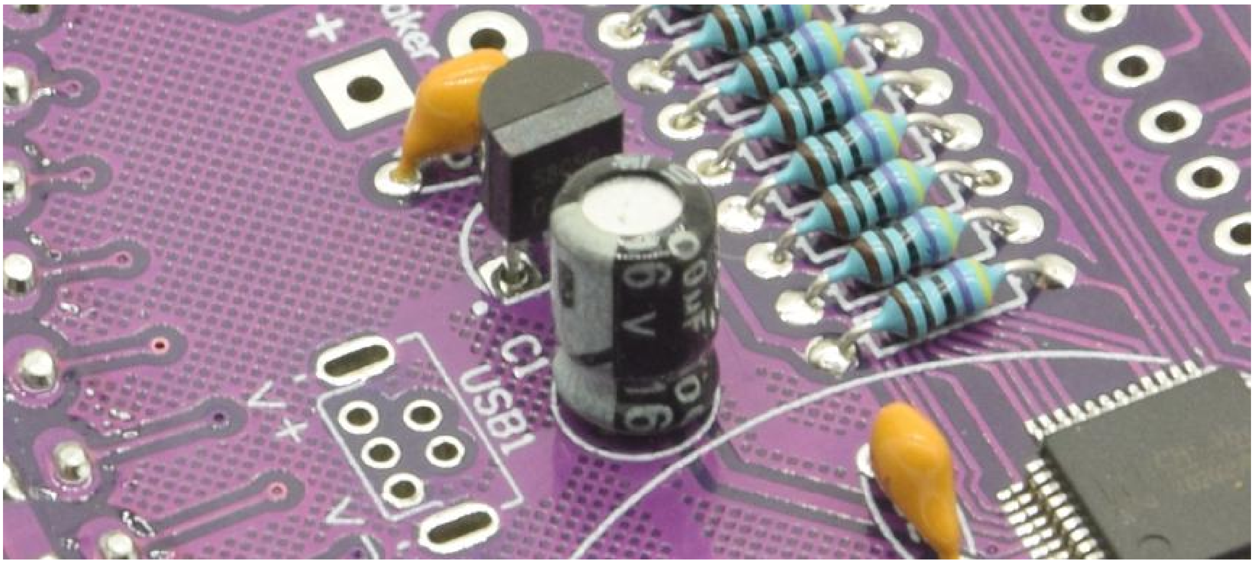
4. **Welded triode**

The triode welding is located in the position of Q1. The three feet of the transistor should be separated and inserted into the three pads of Q1. Note that the plane of the transistor should be opposite to the straight line of the circuit board, as shown in the following figure:



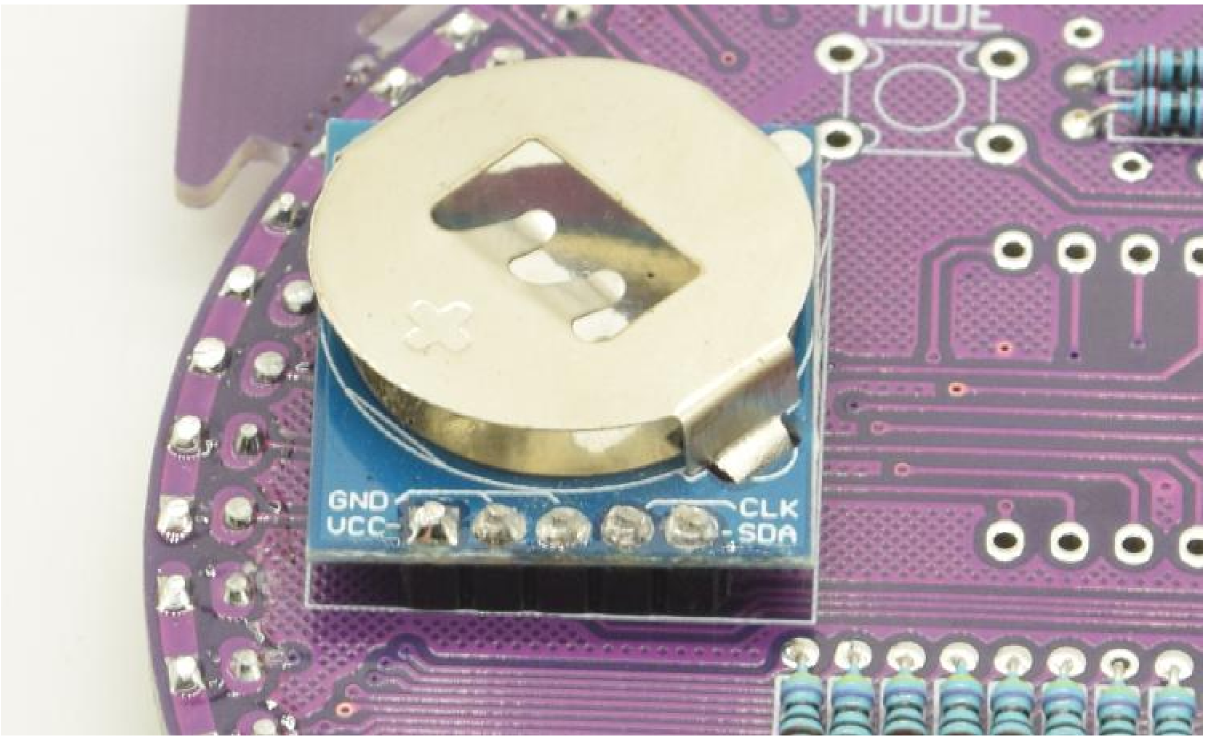
5. **Welding electrolytic capacitor**

The electrolytic capacitor is welded in the position of C1. Note that the positive electrode of electrolytic capacitor should be inserted into the welding pad marked "+", as shown in the following figure:



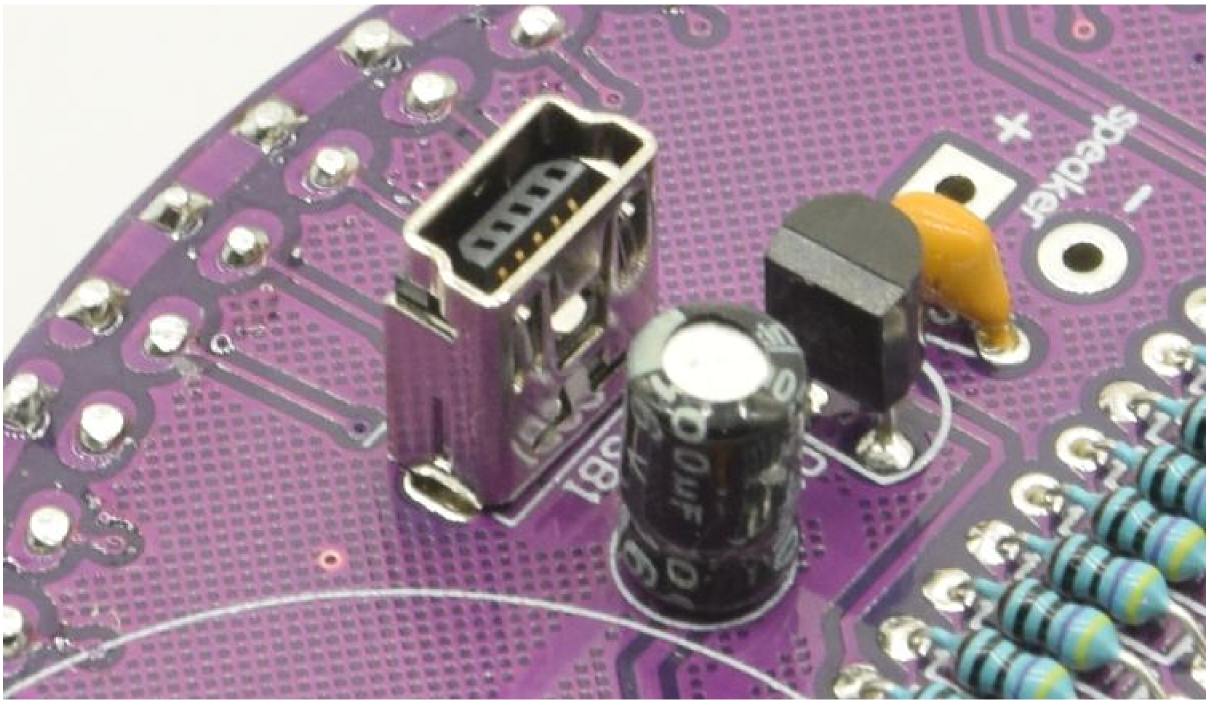
6. **Welding clock module**

The clock module is welded to the M1 position. Watch out for batteries. As shown in the following figure:



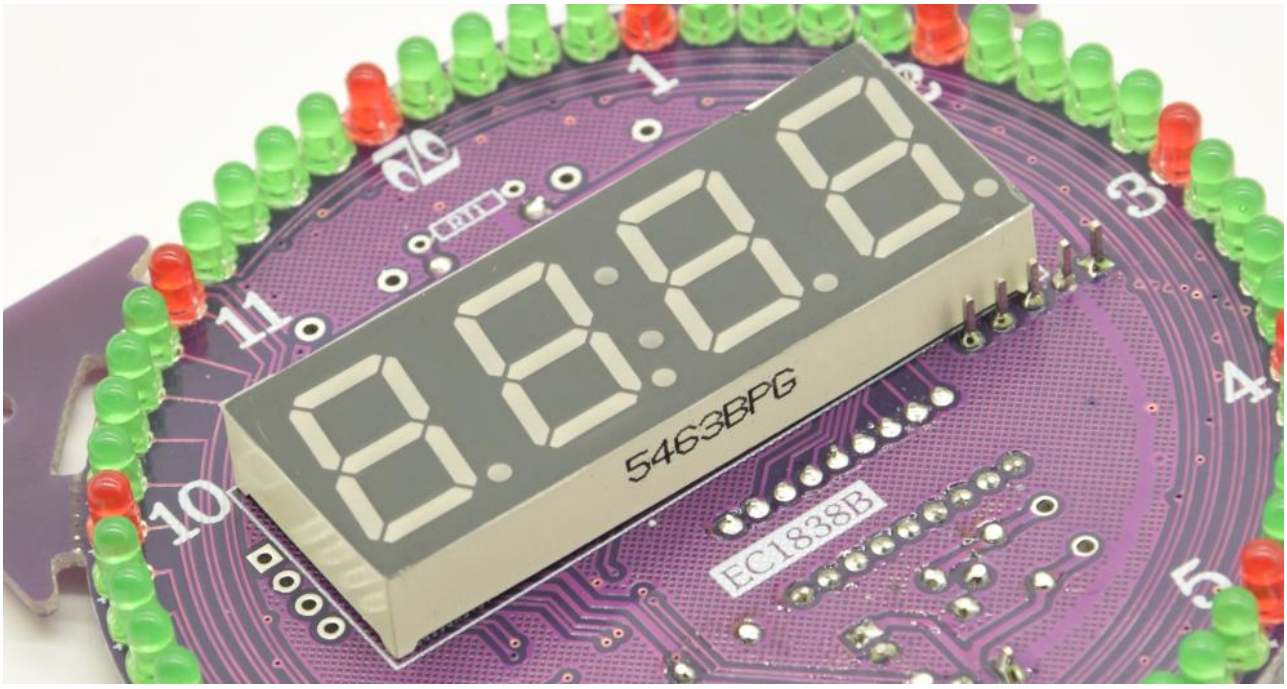
7. **Welding USB seat**

USB is used for power supply and welded to USB1.



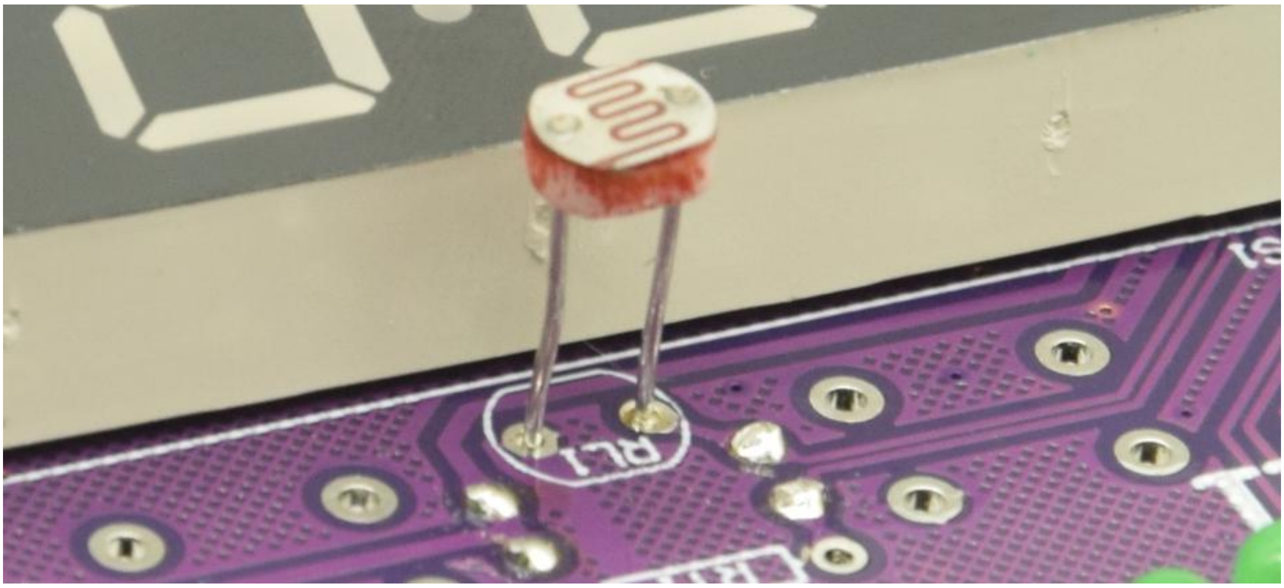
8. **Welding digital tube**

The digital tube is placed on the front side, and the direction of the digital tube should be paid attention to.



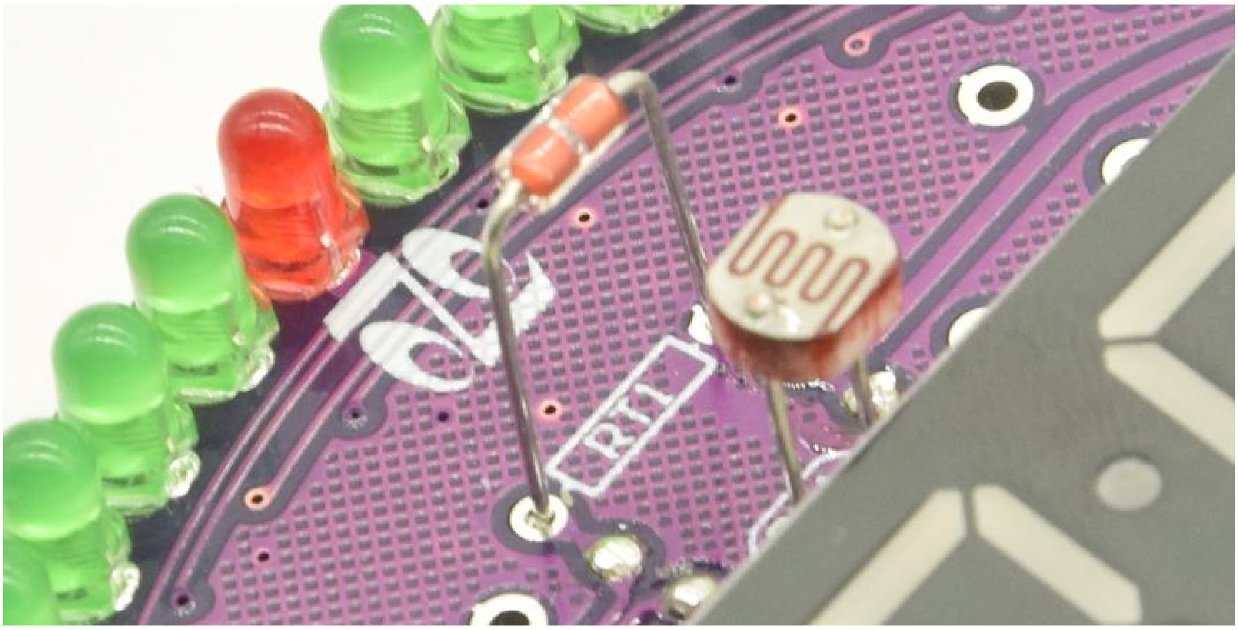
9. **Welding photosensitive resistance**

Photoresistor welding in RL1 position, it should be noted that the photoresistor is higher than the digital tube, otherwise the clock itself will affect the photoresistor, resulting in inaccurate photometry. As shown in the following figure:



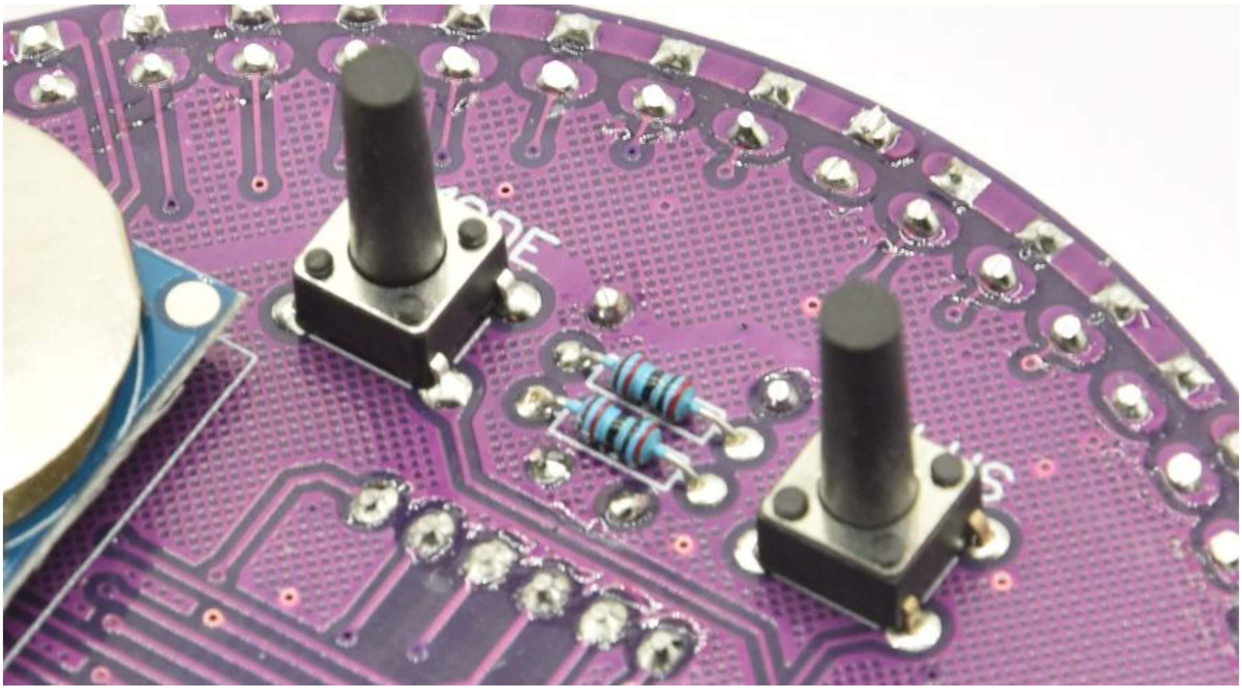
10. **Welding thermistor**

Thermistor welding in RT1 position, but also with photosensitive as high as the measurement of environmental temperature is more accurate. As shown in the following figure:



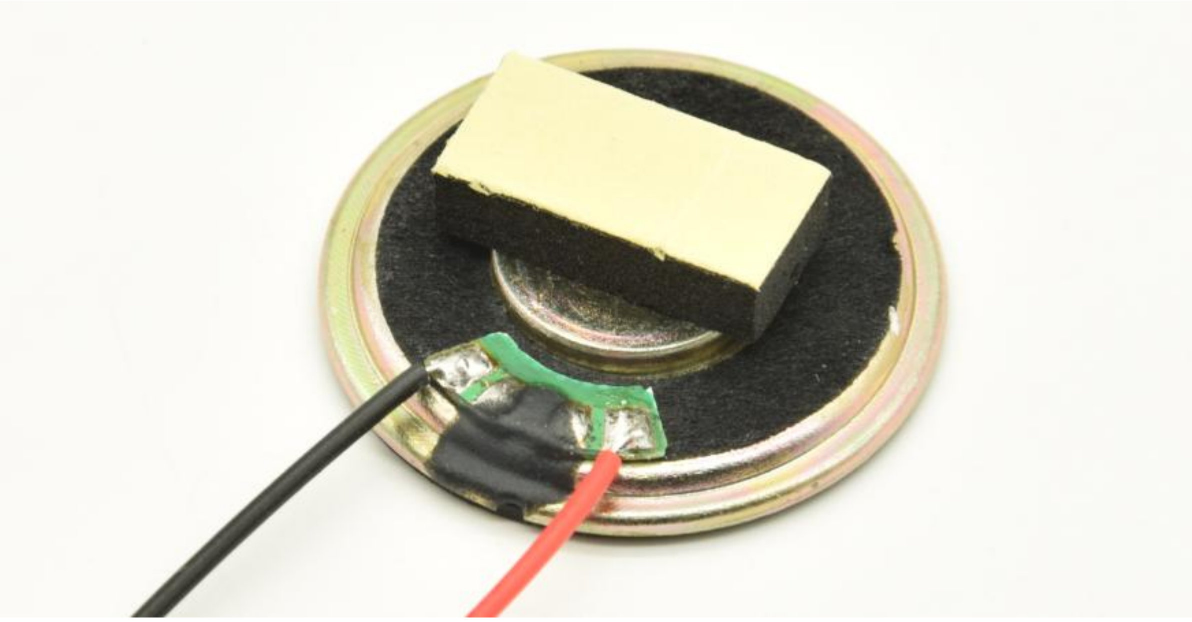
11. **Welding button**

The location of MODE and PLUS on the PCB is as follows:

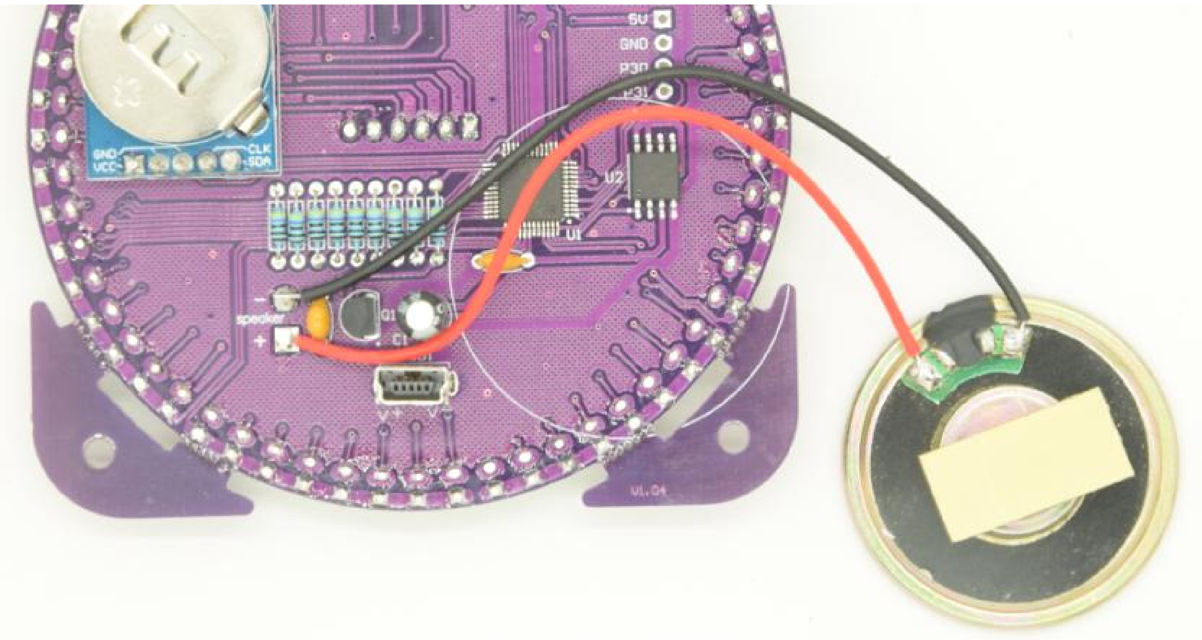


12. Welding loudspeaker

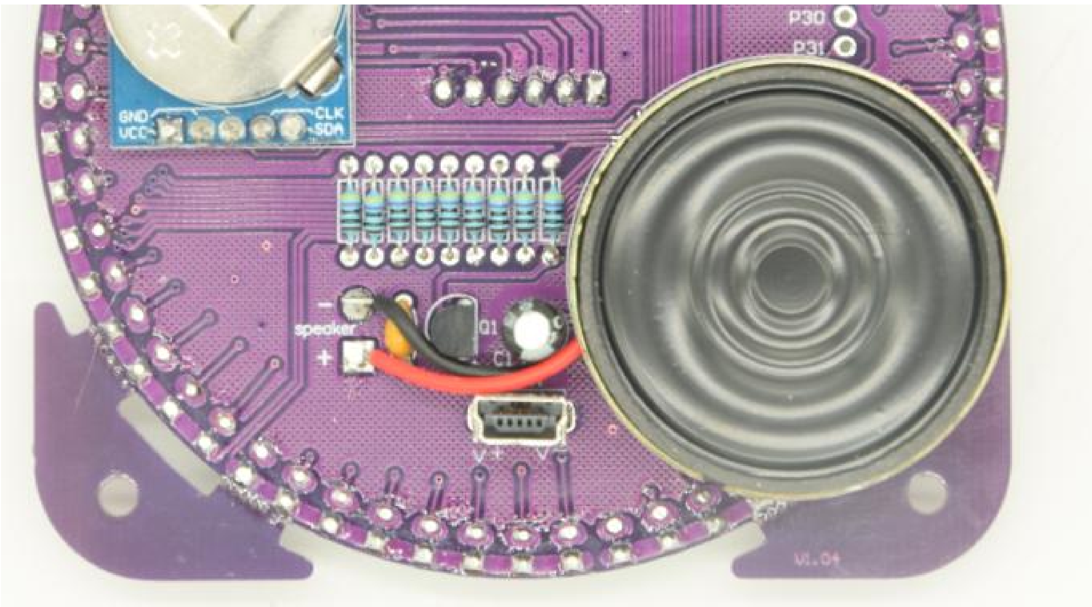
The loudspeaker should be welded in several steps. First, two horn lines are welded to the horn.



The other end of the wire is then soldered to two pads marked with "+" and "-" on the circuit board, as shown below:

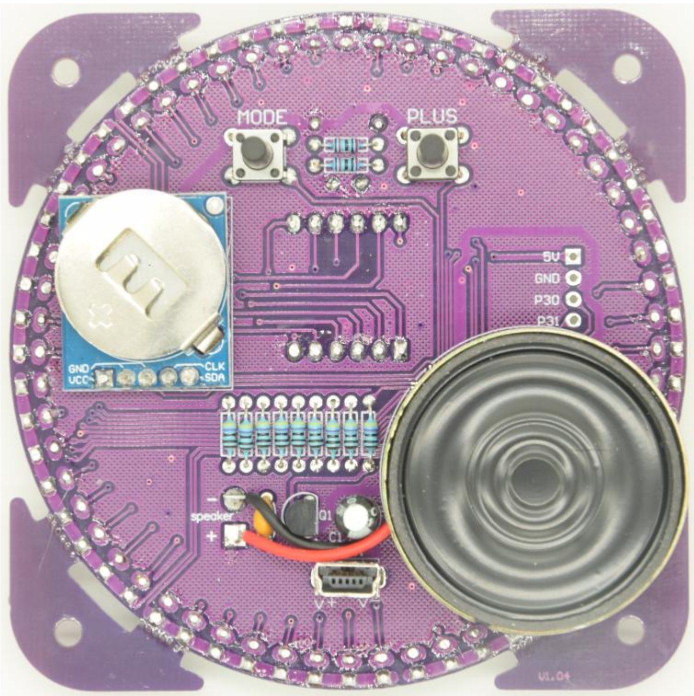


Finally, tear apart the double-sided adhesive protective film on the back of the horn, and stick the horn to the circular area in the picture above. The horn should be aligned with this circle so that it can be aligned with the horn hole on the housing when mounted. As shown in the following figure:



So far, the welding of the clock kit has been completed. Because there are many components in this kit, you must be careful when welding, not to virtual welding, not to weld bad components. When welding, the lead length must be cut short, and then weld the next component, otherwise the lead is too long, may interfere with the welding of the next component, resulting in poor welding.

Finally, two beautiful pictures completed by welding.





IV. Power on debugging

After the last step of welding, you can turn on the power to see if the clock is working properly. If it can be displayed properly, the welding is successful. If the clock does not work, or the display is not normal, indicating that there is a problem in welding, need to be carefully checked, see Chapter 6 for details.

Normal work, when power on, there will be boot music, the lights are on the whole point, seconds walk normally, the middle of the digital tube flashing every second at two o'clock, as shown below:



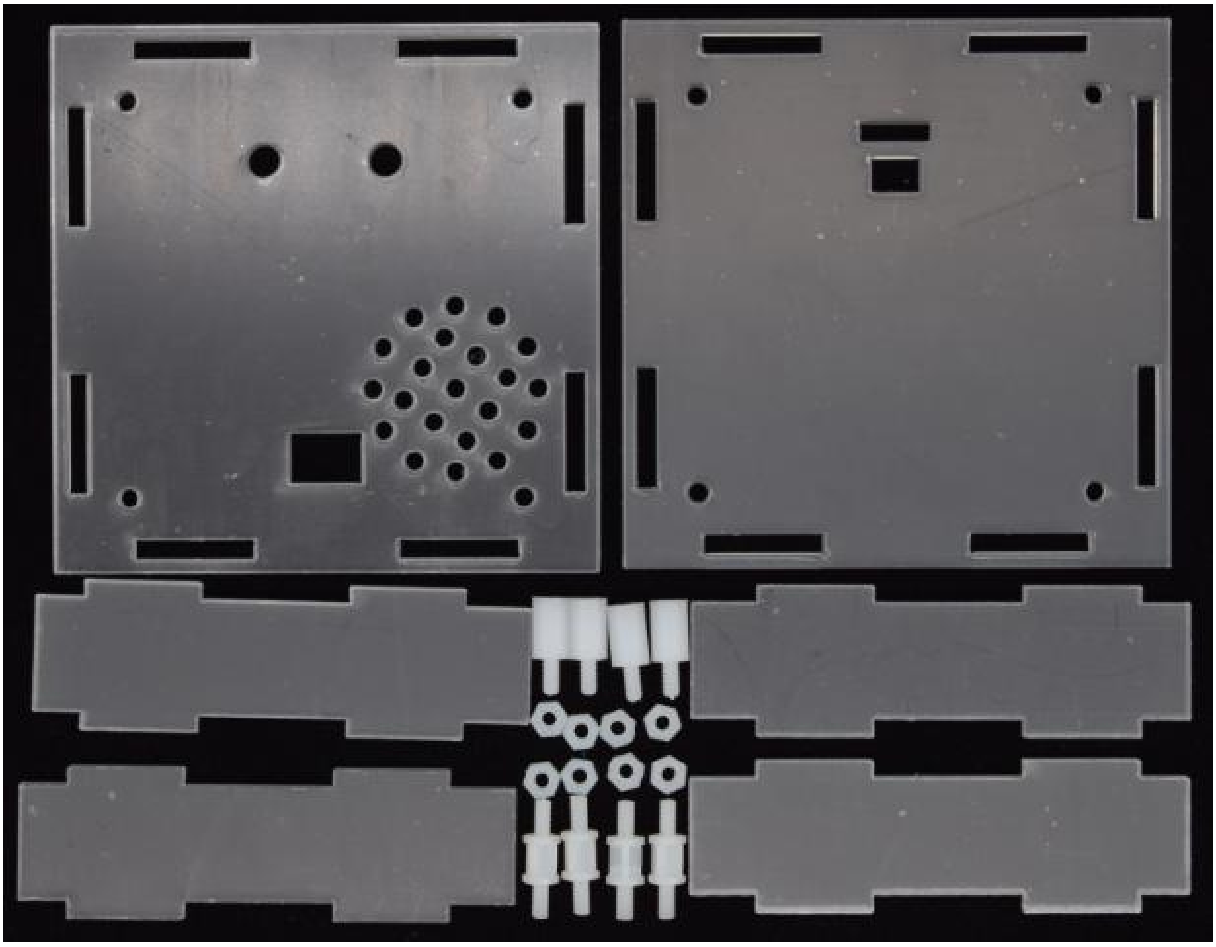
When the display is normal, install batteries on the clock module (note that the positive and negative poles don't be reversed), and then install a housing (if you buy one), it's done!

V. Assembly shell

If you have the shell of this clock, you can start assembling the shell now. Here again recommend the purchase of enclosures, because this suite is the speaker output sound, we all know that the speaker is to be installed in the speaker will be loud, the enclosure of this suite is now equivalent to a speaker.

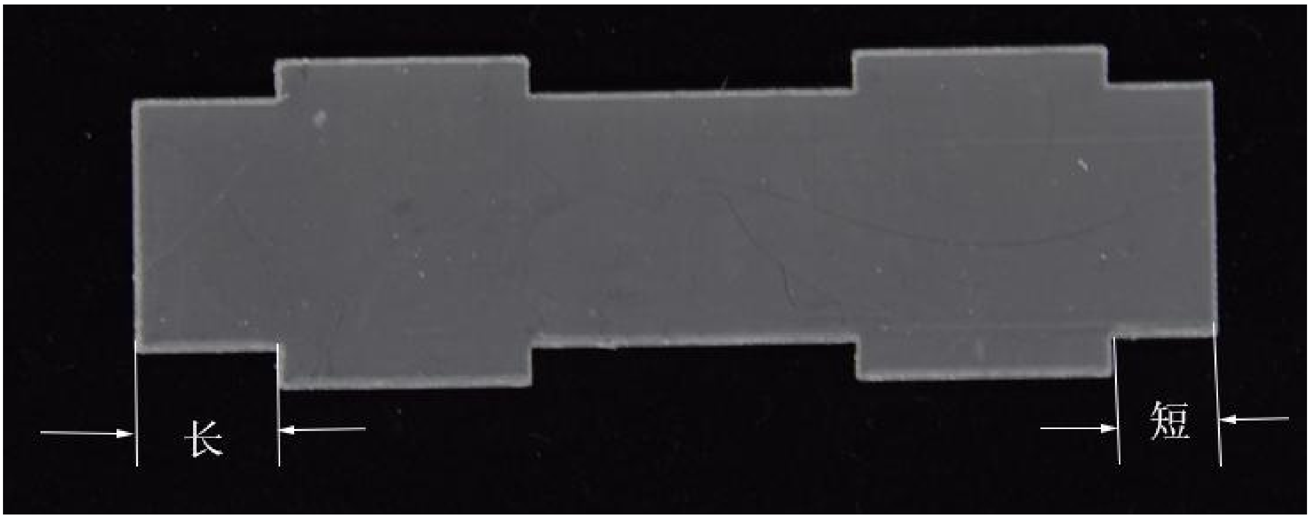
1. Shell composition

First look at what parts of the shell are made up of.

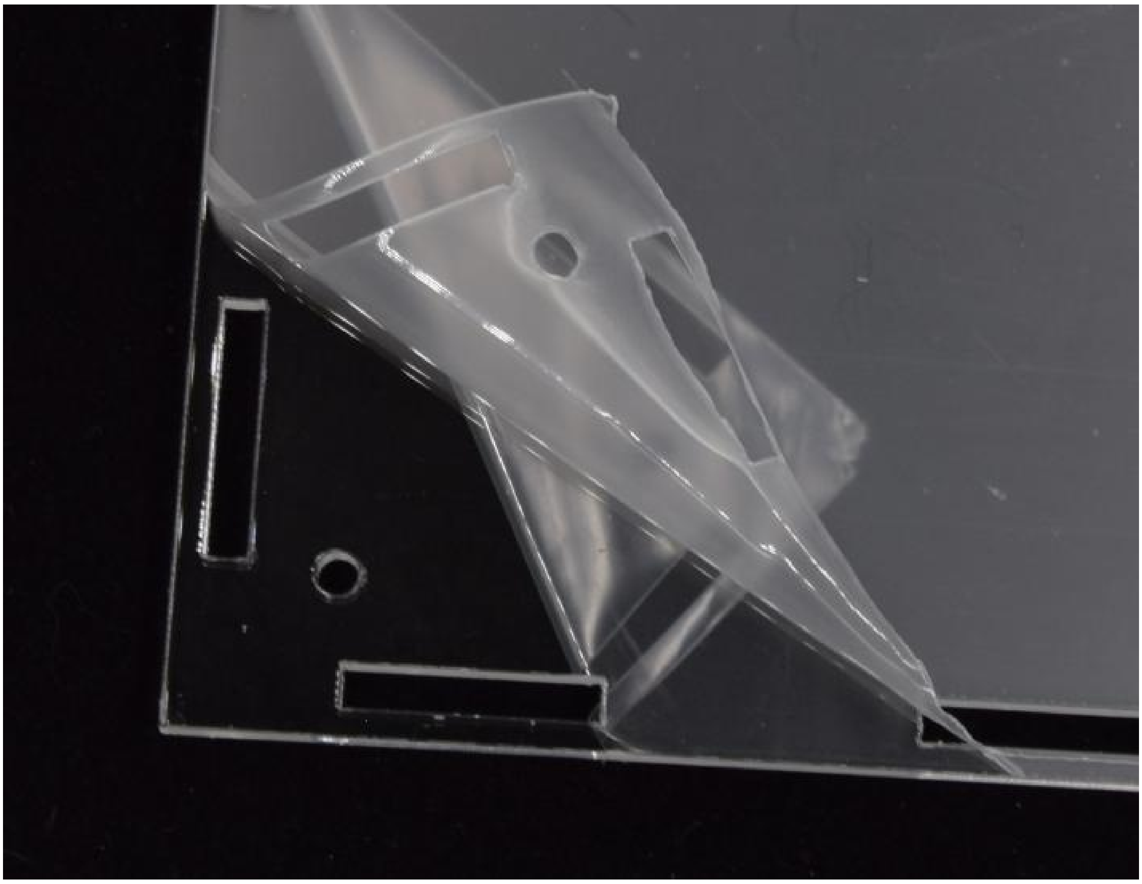


As you can see from the picture above, a complete set of enclosures consists of a front panel, a back panel, four side panels, four single-ended studs, four double-ended studs and eight nuts.

It should be noted that one end of the side board is longer, and the long end of the side board should be immediately followed by the short end of the other board, so that it can just fit the jack hole of the whole back board. As follows:



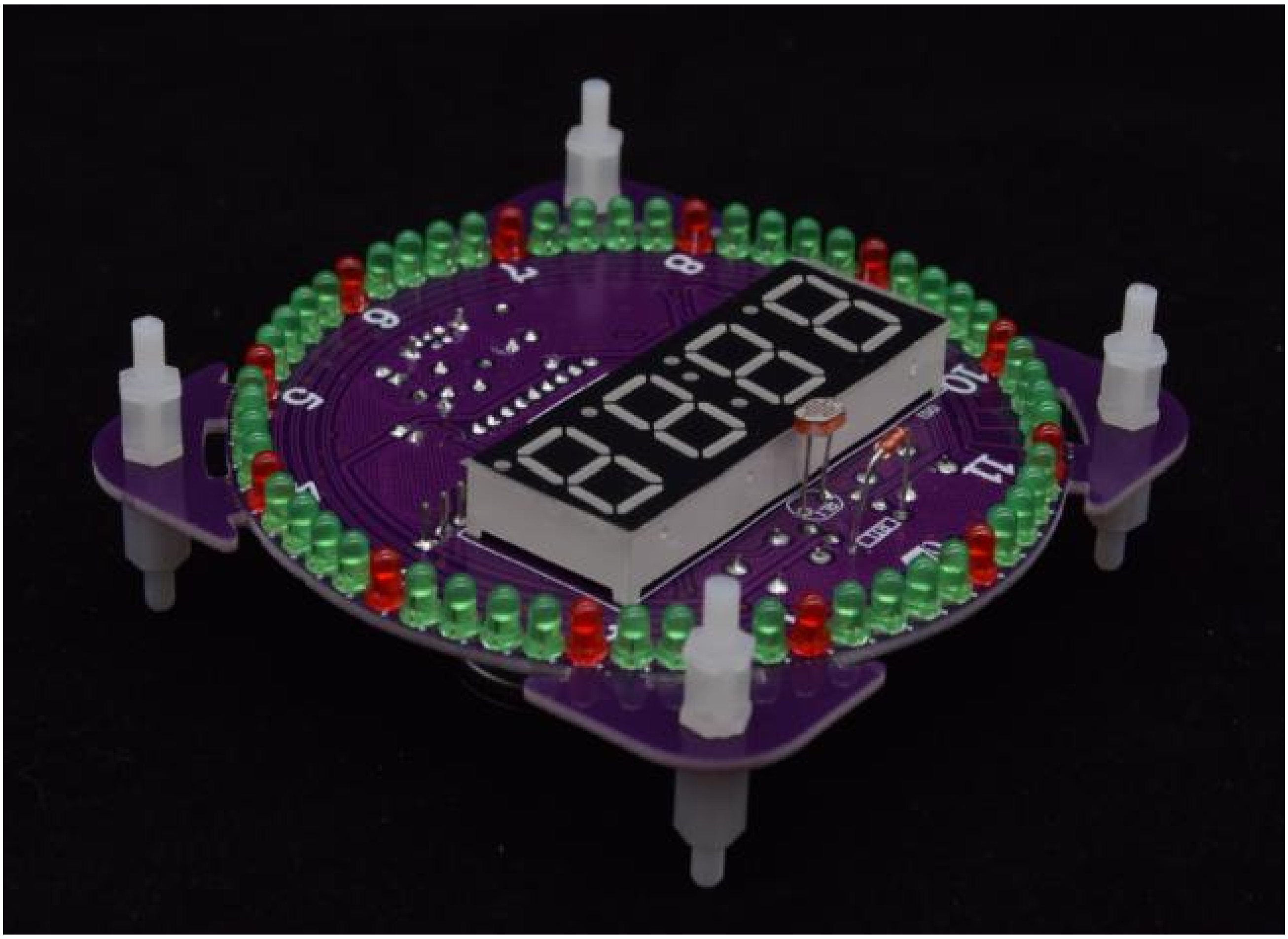
Our shell is fully transparent acrylic board, but this picture is not transparent. Why? Because the acrylic board is affixed with a protective film when it leaves the factory, the protective film can be seen to be completely transparent by tearing it apart. As follows:



We use imported high-end acrylic board, so the protective film is translucent film, if it is low-end acrylic board, protective film is yellow kraft paper.

2. Installation of a stud

After recognizing the shell, the shell is now installed. First, 8 studs are mounted on the board. Note that the stud studs are mounted on the front side, as shown in the following figure:

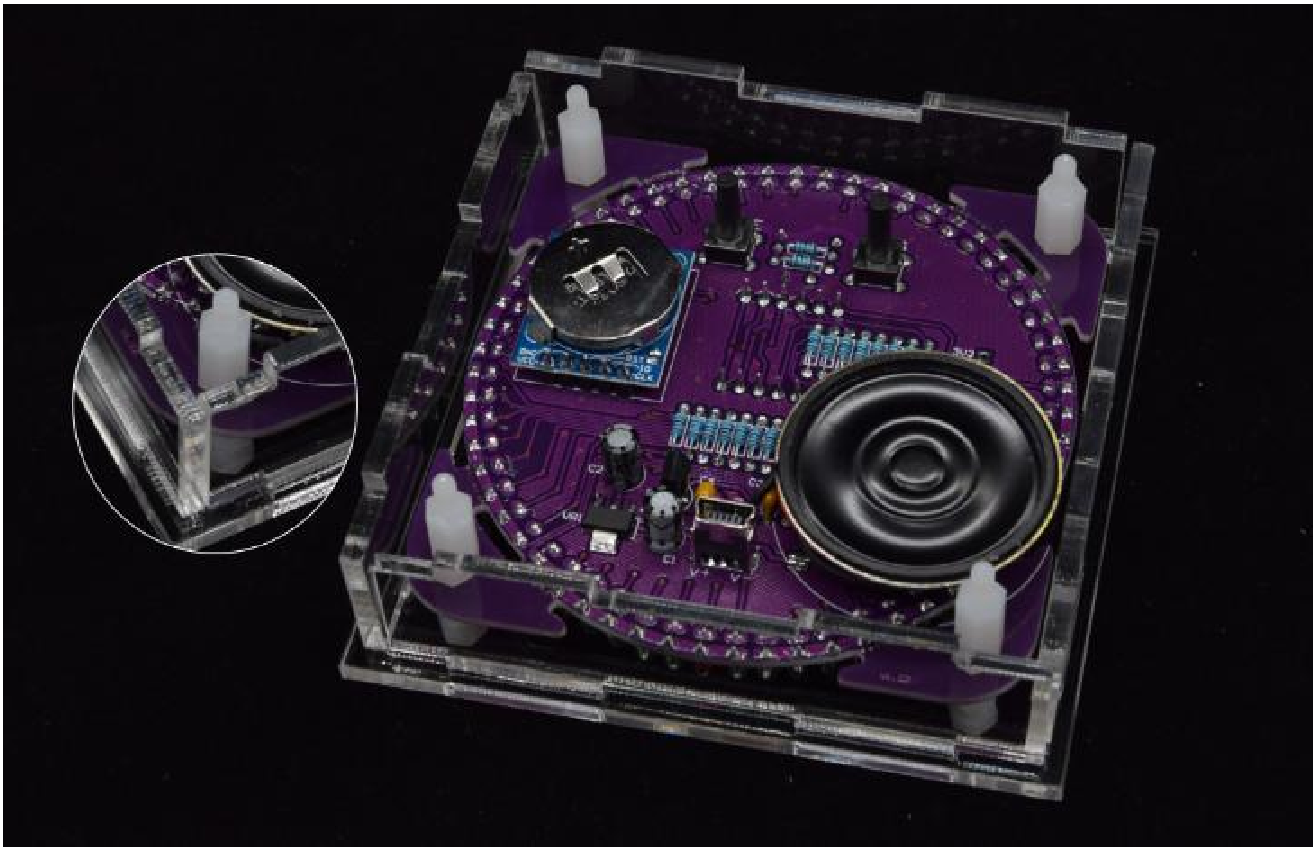


3. Install front panel

Install the front panel and tighten the nut:

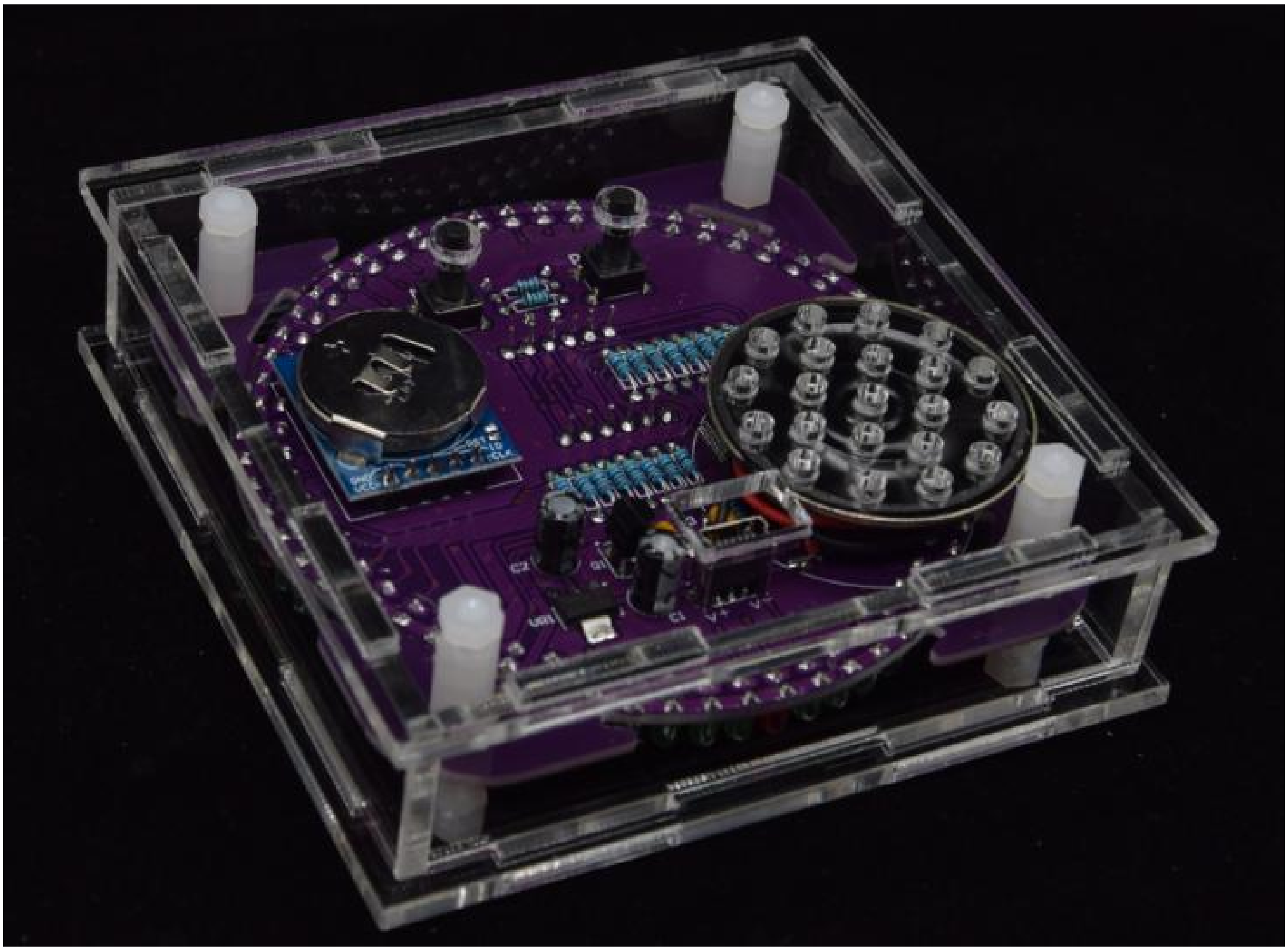


4. Install side panel



Pay attention to the long end of the side board followed by the short end of the other board so that you can just fit the four side boards.

5. Install back panel



Install the back panel and screw the nut.

VI. Troubleshooting some common problems

In order to facilitate your inspection, we have done some self checking functions to help you solve problems quickly.

1. Prompt "Err1"

When the clock module was not properly welded, the MCU did not detect the module. It would prompt "Err1" as follows:



2. Prompt "Err2"

When the thermistor or temperature measuring circuit (RT1 and R10) is not welded well, it will prompt "Err2" as follows:



3. Prompt "Err3"

When the photosensitive resistor or photometric circuit (RL1 and R11) is not welded well, it will prompt "Err3" as follows:



4. Prompt "Err4"

When the program cannot recognize the voice memory chip, this prompt will appear. We will test that the voice memory chip is normal before leaving the factory, and this error will not appear generally. If the customer changes the memory chip, this prompt may appear.

5. Prompt "Err5"

Wav file error prompt. This prompt appears when the wav file name is incorrect or other wav file problems occur.

6. Prompt "Err6"

Single chip verification failure prompt. If you use a single-chip microcomputer that has not been initialized by our store, this prompt will appear.

7. Other error hints

When we find new welding problems, we update them to this document. In order to facilitate everyone to solve problems in time, as far as possible so that all people can weld success.

EC1838B electronic clock manual v1.00

Because this clock has many functions, please read this manual carefully, thank you for your cooperation!

目录

I. A brief introduction to the principle of this clock

This clock uses a single-chip computer to read the time data in the clock chip, and the hours and minutes are output to the data code tube display, and the seconds are output to the peripheral 60 light-emitting diodes. The time in the clock chip can be adjusted by pressing the buttons, and the alarm clock and time signal When the sound is output, the MCU reads the data in the storage chip and outputs the sound to the speaker after data conversion. The MCU can sense the brightness of the environment by collecting the changes of the parameters of the photoresistor and thermistor And temperature, and then do the corresponding control and display.

II. Function introduction

1. Digital tube display

There are red, green, blue and white digital tubes to choose from, and users can also change to other color digital tubes.

The default time of power-on is time, temperature, year, month, day, and week wheel display. You can set to display only time or only time and temperature by pressing the button (set in "Time Display Setting").

2. led display

There are three combinations of red green led, red blue led, blue and white led to choose from. Users can also change to other color led combinations.

13 kinds of display, you can switch the display by pressing the button. You can also set the button to switch to the automatic display (set in the "LED automatic switching display setting"), when the LED switching display parameter x is less than 60, the time to switch the display is x * 1 Minutes, when it is greater than 60, the display switching time is (x-60) * 60 minutes, when x = 0, the display is not automatically switched. For example: when set to 30, switch to the next display every 30 minutes. When set to 62 (greater than 60), switch to the next display every (62-60) * 60 minutes (that is, 2 hours).

3. Clock accuracy

There are two clock modules, ds1302 and ds3231, to choose from.

When using the ds1302 module as the clock, the cost is relatively low, but the accuracy of the travel time cannot be guaranteed. Some modules may have an error of a few seconds a day, which is normal. It is normal to require high accuracy for travel time. It is not recommended to buy the ds1302 version. clock.

When using the DS3231 module as a clock, the cost will be a little higher, but the travel time is accurate. The official declared accuracy is ± 2ppm (that is, the error is about 1 minute per year), please refer to the technical data of the DS3231 for detailed parameters. It is recommended for high travel accuracy Purchase the DS3231 version of the clock.

4. time setting

The time can be set by pressing the button. When the battery is correctly installed on the clock module, even if the clock is powered off, it will run normally without resetting the time every time the power is turned on.

5. Clock calibration

Since this clock is a kit, the clock will inevitably have errors after welding. To maximize the accuracy of the clock, this function is done. You can correct the clock error by setting the error time and the amount of error. For example: the clock is fast every 24 hours 2 seconds, then the error time is set to 24, and the error amount is set to -2. If it is 8 seconds slower every 24 hours, then the error time can be set to 3, and the error amount is set to 1.

6. Sound output

Use the speaker to output sound. Since the speaker needs a sound cavity to output loud and nice sound, it is recommended to buy a clock with a case.

Multiple pieces of music are built into the memory chip, which can be set as alarm clock, hourly time signal and ringtone for power-on.

The volume can be set.

7. Download ringtones

This kit can download ringtones to the clock yourself. For how to download, please refer to the ringtone download tutorial.

8. Time signal

Press the plus button to broadcast the current time. You can set the time in Chinese or English.

9. report punctually

It can be turned on or off.When it is turned on, when the current time meets both the hour and the time zone, you can report the time.You can set the time zone (for example, you can set the hour to 8 o'clock in the morning to 22 o'clock in the evening, and the time is not at other times) Can set the time signal ringtone and time signal language (Chinese or English).

10. Alarm clock

There are 4 alarm clocks, which can be turned off or on separately, and the alarm duration, alarm ringtone and alarm mode can be set separately.

When the alarm is turned on and the current time meets the hour, minute, and mode of the alarm at the same time, the alarm can sound.

When the alarm time exceeds the set alarm time or press the mode button during the alarm to stop the alarm.

Snooze function: Press the plus button when the alarm sounds, pause the alarm, and then re-alert after five minutes.

6 alarm clock modes to meet various needs.

Alarm mode 0: Normal alarm, it will sound every day.

Alarm mode 1: Alarm 1 on weekdays, Monday to Friday, no alarm on Saturday and Sunday.

Alarm mode 2: Weekend alarm 1, alarm on Saturday and Sunday, no alarm on Monday to Friday.

Alarm mode 3: Alarm 2 on weekdays, Monday to Saturday, no alarm on Sunday.

Alarm mode 4: Weekend alarm 2, alarm on Sunday, no alarm from Monday to Saturday.

Alarm Mode 5: Single alarm, it will automatically turn off after one alarm.

11. Boot music

When the clock is powered on, it will automatically play a piece of music. You can choose any piece of music in the memory chip as the boot music. Of course, if you don't like it, you can also set it to not play music when powered on.

12. temperature display

Use the thermistor to measure the ambient temperature. It can be set to display in degrees Celsius or Fahrenheit. When the clock is displaying the temperature, press the mode key to switch to the display in Fahrenheit or Celsius. When the temperature is not accurate, you can do temperature calibration Calibration settings "(for example: when the displayed temperature is 3 degrees higher than the actual temperature, set the temperature calibration value to -3). Please note that the displayed temperature is the temperature measured by the current environment, not the weather forecast Temperature.

13. Temperature broadcast function

Report the current temperature after the time is over. You can also set to not report the temperature.

14. Brightness adjustment function

Use the photoresistor to measure the ambient brightness. When the automatic brightness function is turned on, the brightness of the clock can be automatically changed according to the brightness of the ambient light. When the automatic brightness function is turned off, the clock brightness can be manually adjusted (a total of 100 levels of brightness can be adjusted).

15. 12/24 hour system

The default is the 24-hour system, which can be set to the 12-hour system by pressing the button (set in the "12 / 24-hour setting mode").

16. Sunday display

It is not correct to display Sunday as Sunday. The correct display should be Sunday, but it is increased to take care of the habits of some people and foreigners may not recognize Sunday. When the clock is displaying Sunday, press the mode key to set the Sunday display Sunday or Sunday 7.

17. Restore factory default settings

Power off the clock and remove the memory battery, wait for about two minutes, and then power on the clock.

18. Some error messages that may appear

1、"Err1" is displayed. The clock module is not soldered or soldered incorrectly.

2、"Err2" is displayed. The thermistor (temperature measuring circuit) is not soldered or soldered incorrectly.

3、"Err3" is displayed. The photoresistor (photometric circuit) is not soldered or soldered incorrectly.

4、"Err4" is displayed. The memory chip is incorrect or unrecognizable.

5、"Err5" is displayed. Memory chip sound file error.

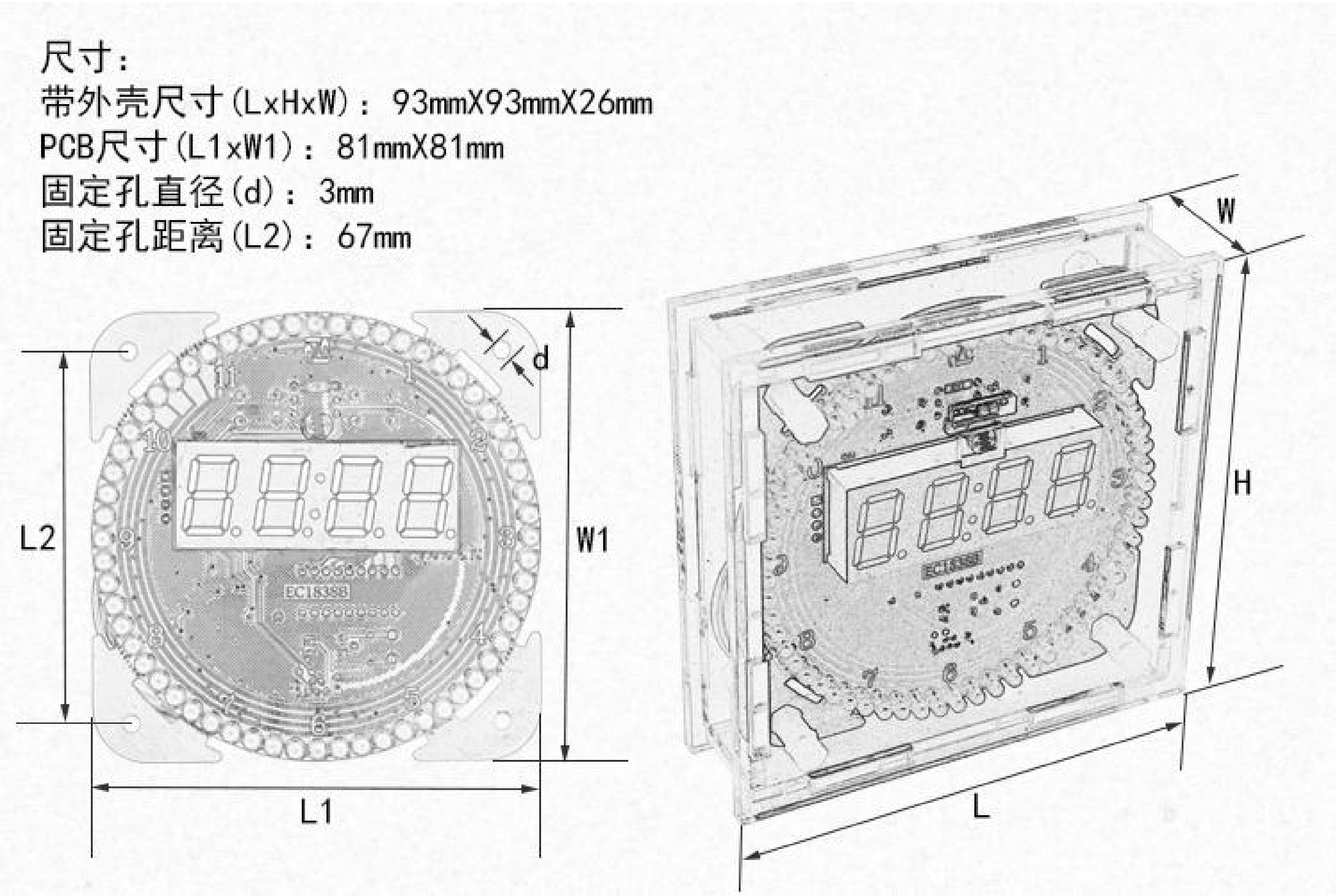
6、"Err6" is displayed. The microcontroller detected an error.

19. Firmware upgrade

After reaching the player, the clock function can be improved and upgraded, the source code is provided, and the player can also modify the clock function by himself.

III. Hardware Introduction

Product Size:



weight:

Finished product without shell: 82g

Finished product including shell: 168g

IV. Electrical performance

Power supply: DC5v
Working current: <30ma
Alarm current: <300mA
Working temperature: 0 ~ 40 ℃

V. Electronic clock display and key functions

1. Time display

	Show description	Mode key function in current mode	Plus key function in current mode
Time display mode (default mode at power-on)	There are 3 display modes: 1, time, temperature, year, month, day, week wheel display. 2. time, temperature wheel display. 3. only time.	1、Press and hold for 1 second to enter the time setting mode. 2、Press and hold for 3 seconds to enter hourly timekeeping and alarm setting. 3、Press and hold for 5 seconds to enter the function setting. 4、When displaying Sunday, change the display method of Sunday. 5.When displaying the temperature, switch to Celsius or Fahrenheit.	1、Rotate once to display time, temperature, year, month, day, and week. 2、Press and hold the mode key first and then press the plus key to switch the LED display style (a total of 12 display styles), and the LED display can be turned off. 3、Time signal. 4、When the alarm sounds, enter snooze mode (alarm is paused, and it will sound again after 5 minutes).

2. Time setting

This setting can modify the time of the clock.Under each setting, if there is no key press for 10 seconds, it will automatically return to the time display and restore the previous time.

mode	Show description	Plus key function in current mode	Mode key function in current mode
Time display mode			Press and hold for 1 second to enter the year setting
Year setting	Four digital tubes flash at the same time to display the year	Set year, long press to set quickly	Enter month setting
Month setting	The first two nixie tubes flash to display the month, and the last two nixies show the day	Set month, long press to quickly set	Enter the day setting
Day setting	The first two nixie tubes display the month, and the last two nixies flash the day	Set the day, long press to quickly set	Enter hour setting
Hour setting	When the first two nixie tubes flash, the last two nixie tubes are always on. When it is 24 hours, it displays "H"; when it is 12 hours, it displays "A" in the morning and "P" in the afternoon.	When setting, long press to set quickly	Enter minute setting
Minute setting	When the first two nixie tubes are on, the last two nixies flash	Set points, long press to quickly set	Enter second setting
Seconds setting	The first two nixie tubes display "-", the second two nixies flash for seconds	Set seconds, long press to quickly set	If there is an adjustment time, save the settings, otherwise do not save the settings and return to the time display mode.

3. Hourly time signal and alarm clock settings

In each setting mode, long press the mode button for 3 seconds or 10 seconds without any button press, it will automatically return to the time display mode and save the settings.

mode	Show description	Plus key function in current mode	Mode key function in current mode
Time display mode			Press and hold the mode key for 3 seconds to enter the hourly time enable setting
Hourly time enable setting	The first two nixie tubes display "01", and the last two nixie tubes flash "On" or "OF", which means turning on or off the hourly time signal function respectively.	Turn on or off the hourly time signal	When the hourly time signal is turned on, enter the hourly time start time setting. When the hourly time is closed, enter the Chinese and English time switch.
Hourly time start time setting	The first two digital tubesLong display "02", the last two digital tubes flash to show the start time	Set the start time (for example: the start time is set to 8 and the end time is set to 22, then every hour from 8 o'clock to 22 o'clock every day will be hourly)	Enter the hourly time end time setting
Hourly time end time setting	The first two nixie tubes display "03", and the last two nixies flash to show the end time	Set the end time (for example: the start time is set to 8 and the end time is set to 22, then every hour from 8 o'clock to 22 o'clock every day will be hourly)	Enter hourly time ringtone settings
Hourly time ringtone setting	The first two nixie tubes display "04", and the last two nixie tubes flash the name of the ringtone.	Set hourly time signal ringtone	Enter Chinese and English time switch
Time switch between Chinese and English	The first two nixie tubes display "05", and the last two nixies flash "En" or "Cn", which means timekeeping in English or Chinese respectively.	Set time report in Chinese or English	Enter the alarm 1 enable setting
Alarm 1 enable setting	The first two nixie tubes display "10", and the last two nixies flash "On" or "OF", which means turn on or off the alarm 1.	Turn on or off the alarm 1	When the alarm 1 is turned on, enter the hour setting of alarm 1. When the alarm 1 is turned off, enter the alarm 2 enable setting.
Hour setting for alarm 1	The first two nixie tubes display "11", and the second two nixie tubes flash to show the time of alarm 1.	Set the hour of alarm 1, long press to set quickly.	Enter the minute setting of alarm 1
Minute setting for alarm1	The first two nixie tubes display "12", and the last two nixies flash the alarm clock 1	Set the minute of alarm 1, long press to set quickly.	Enter the alarm time setting of alarm 1

Alarm 1 alarm time setting	The first two nixie tubes will display "13", and the last two nixies will flash to show the duration of alarm 1.	Set the alarm duration of alarm 1, the setting range is 1 ~ 20 minutes.	Enter the ringtone setting of alarm 1
Alarm 1 ringtone setting	The first two nixie tubes display "14", and the last two nixies flash the name of the ringtone of alarm 1.	Set the ringtone for alarm 1.	Enter alarm 1 mode setting
Alarm 1 mode setting	The first two nixie tubes display "15", and the last two nixie tubes flash the alarm 1 mode.	Set the alarm mode of alarm 1.	Enter the alarm 2 enable settings
Alarm 2 enable setting	The first two nixie tubes display "20", and the last two nixies flash "On" or "OF", which means turn on or off the alarm 2.	Turn on or off the alarm 2	When the alarm 2 is turned on, enter the Hour setting of alarm 2. When the alarm 2 is turned off, enter the alarm 3 enable setting.
Hour setting for alarm 2	The first two nixie tubes display "21", and the second two nixie tubes flash to show the time of alarm 2.	Set the hour of alarm 2, long press to quickly set.	Enter the minute setting of Alarm 2
Minute setting for alarm 2	The first two nixie tubes display "22", and the last two nixies flash the alarm clock 2	Set the minute of alarm 2, long press to set quickly.	Enter the alarm time setting of alarm 2
Alarm 2 alarm time setting	The first two nixie tubes display "23", and the last two nixie tubes flash to show the duration of the alarm 2	Set the alarm duration of alarm 2, the setting range is 1 ~ 20 minutes.	Enter the ringtone setting of Alarm 2
Alarm 2 ringtone setting	The first two nixie tubes display "24", and the second two nixie tubes flash the name of the ringtone of alarm 2.	Set the ringtone for Alarm 2.	Enter alarm 2 mode setting
Alarm 2 mode setting	The first two nixie tubes display "25", and the last two nixies flash the alarm clock 2 mode.	Set the alarm mode of Alarm 2.	Enter the alarm 3 enable settings
Alarm 3 enable setting	The first two nixie tubes display "30", and the last two nixies flash "On" or "OF", which means turn on or off the alarm 3.	Turn on or off the alarm 3	When alarm 3 is turned on, enter the hour setting of alarm 3. When the alarm 3 is turned off, enter the alarm 4 switch setting.
Hour setting for alarm 3	The first two nixie tubes display "31", and the last two nixies flash the alarm clock 3.	Set the hour of the alarm 3, long press to quickly set.	Enter the minute setting of alarm clock 3
Minute setting for alarm 3	The first two nixie tubes display "32", and the last two nixies flash the alarm 3	Set the minute of the alarm 3, long press to quickly set.	Enter the alarm time setting of alarm 3

Alarm 3 alarm time setting	The first two nixie tubes display "33", and the last two nixie tubes flash to show the length of alarm 3	Set the alarm duration of alarm 3, the setting range is 1 ~ 20 minutes.	Enter alarm 3 ringtone settings
Alarm 3 ringtone setting	The first two nixie tubes display "34", and the last two nixies flash the name of the ringtone of alarm 3.	Set the ringtone for alarm 3.	Enter alarm 3 mode setting
Alarm 3 mode setting	The first two nixie tubes display "35", and the last two nixies flash the alarm 3 mode.	Set the mode of Alarm 3.	Enter the alarm 4 enable settings
Alarm 4 enable setting	The first two nixie tubes display "40", and the last two nixies flash "On" or "OF", which means turn on or off the alarm 4.	Turn on or off the alarm 4	When the alarm 4 is turned on, enter the hour setting of the alarm 4. When the alarm 4 is turned off, it returns to the time display mode.
Time setting for alarm 4	The first two nixie tubes display "41", and the last two nixies flash the alarm clock 4.	Set the hour of the alarm 4, long press to quickly set.	Enter the minute setting of alarm clock 4
Minute setting for alarm 4	The first two nixie tubes display "42", and the last two nixies flash the alarm clock 4	Set the minute of the alarm 4, long press to quickly set.	Enter the alarm time setting of alarm 4
Alarm 4 alarm time setting	The first two nixie tubes display "43", and the last two nixie tubes flash to show the duration of alarm 4.	Set the alarm duration of alarm 4, the setting range is 1 ~ 20 minutes.	Enter alarm 4 ringtone settings
Alarm 4 ringtone setting	The first two nixie tubes display "44", and the last two nixie tubes flash the name of the ringtone of alarm 4.	Set the ringtone for alarm 4.	Enter alarm 4 mode setting
Alarm 4 mode setting	The first two nixie tubes display "45", and the last two nixies flash the alarm 4 mode.	Set the mode of Alarm 4.	Return to time display mode and save settings

4. Function settings

In each setting mode, long press the mode button for 3 seconds or 10 seconds without any button press, it will automatically return to the time display mode and save the settings.

mode	Show description	Plus key function in current mode	Mode key function in current mode
Time display mode			Press and hold for more than 5 seconds to enter the automatic brightness enable setting

Automatic brightness enable setting	The first two nixie tubes display "1-", and the last two nixies flash "On" or "OF", which means that the auto brightness function is turned on or off respectively.	Turn auto brightness on or off	When the auto brightness function is turned off, enter the brightness setting. When the automatic brightness function is turned on, enter the temperature calibration setting.
Brightness setting	The first two nixie tubes display "2-" permanently, and the second two nixie tubes flash to show the light control level parameters.	Set the brightness (the range is 01 ~ 100, when 100 is displayed as 00). This function is effective when the auto brightness function is turned off	Enter temperature calibration settings
Temperature calibration settings	The first two nixie tubes display "3-" permanently, and the last two nixies flash the temperature calibration value	Set the temperature calibration value, the range is -9 ~ 10. For example, when the display temperature is 3 degrees higher than the actual temperature, set the calibration value to -3.	Enter the report temperature setting
Report temperature switch setting	The first two nixie tubes display "4-" permanently, and the second two nixie tubes flash "On" or "OF", indicating that the temperature reporting function is turned on and off respectively.	Turn the temperature reporting function on or off	Enter 12/24 hour display settings
12/24 hours switch settings	The first two nixie tubes display "5-", and the last two nixie tubes flash "12" or "24", indicating 12-hour display or 24-hour display, respectively	Set 12/24 hour display	Enter time display mode setting
Time display mode setting	The first two nixie tubes display "6-", and the last two nixie tubes flash to show the wheel display mode	Set the display mode (a total of 3) 0: only display time. 1: time, temperature, year, month, day, week wheel display. 2: time, temperature wheel display	Enter led automatic switch display setting
LED automatic switching display settings	The first two nixie tubes display "7-", and the last two nixie tubes flash to show the LED change time parameter	Set the time parameter of led change (0 is fixed display). For example: when set to 30, switch to the next display every 30 minutes. When set to 62 (greater than 60), switch to the next display every (62-60) * 60 minutes (that is, 2 hours) (range: 0 ~ 84).	Enter volume setting
Volume setting	The first two nixie tubes display "8-", and the last two nixie tubes flash to show the volume	Set the volume (a total of 5 levels)	Enter the power on music switch settings

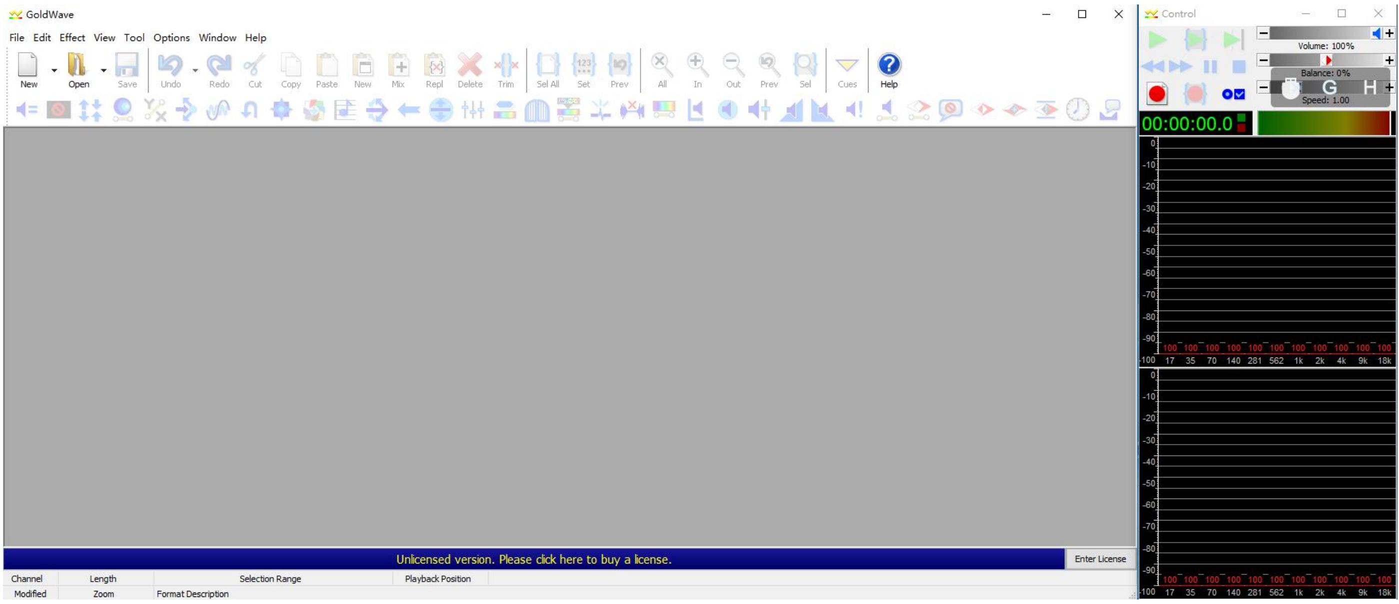
Power on music switch setting	The first two nixie tubes display "9-", and the last two nixie tubes flash "On" or "OF", indicating that music is played or not played when the phone is turned on.	Set to play or not to play music at power on	When setting to play music at boot, enter the boot music settings. When it is set to not play music at startup, return to the time display mode and save the settings.
Boot music settings	The first two nixie tubes display "A-", and the last two nixie tubes flash to show the name of the boot music	Set boot music	Enter error time setting
Error time setting	The first two nixie tubes display "b-", and the last two nixie tubes flash the clock error time	Set the error time (range 0 ~ 96). For example: the clock is 2 seconds faster than every 24 hours, then the error time is set to 24, and the error amount is set to -2.	Enter error amount setting
Error amount setting	The first two nixie tubes display "C-", and the second two nixie tubes flash the error of the clock	Set the error amount (range -6 ~ 6). For example: the clock is 2 seconds faster than every 24 hours, then the error time is set to 24, and the error amount is set to -2.	Return to the time display mode and save the settings.

VI, ringtone download tutorial

This clock can update the internal ringtone by using our downloader. The specific operations are as follows, please be sure to come in order, otherwise the download may not be successful.

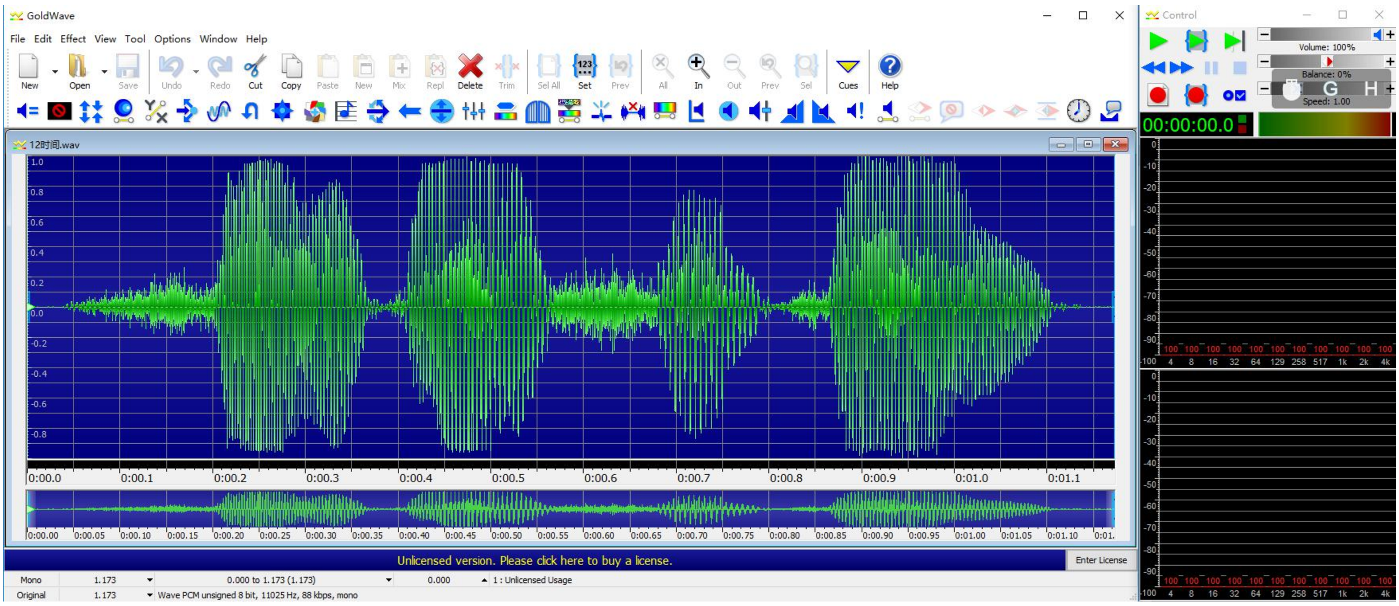
1. Audio processing software

Due to the limited processing power of the microcontroller,Cannot process all audio files, currently only WAV files can be processed, and the audio sampling rate cannot exceed 16K, the number of sampling bits is 8 bits, and mono. Such parameter files are difficult to find on the Internet, so it is best to use The software converts itself. Here we recommend using the GoldWave software. The official download address is http://www.goldwave.com. This software is not free. If you want to use it for a long time, it is still recommended to buy it. After downloading, please click install. It's very simple, just press the next step, and finally complete it. After the installation is complete, the interface is as follows:

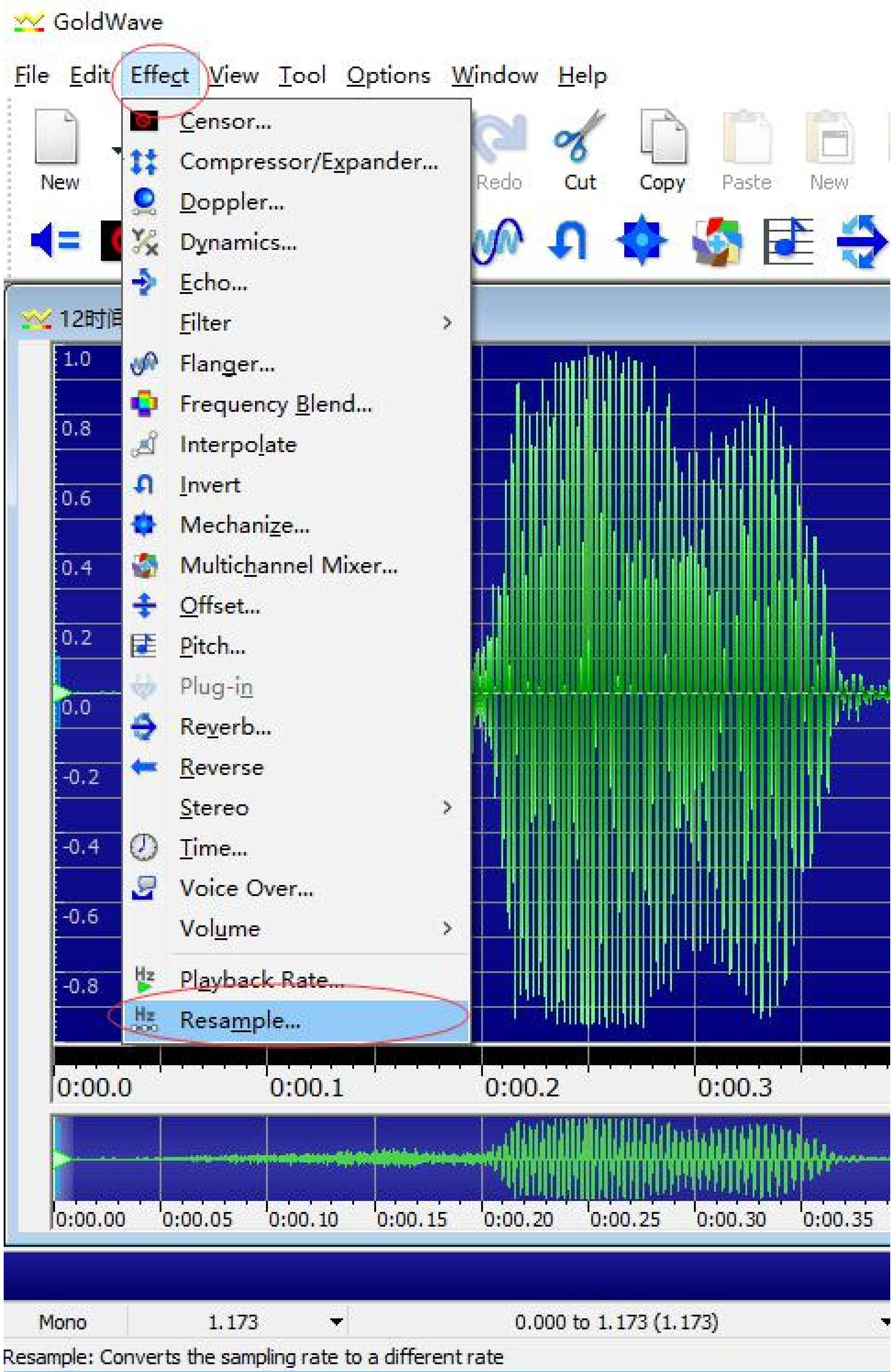


After installation, you can modify the parameters of an audio file.

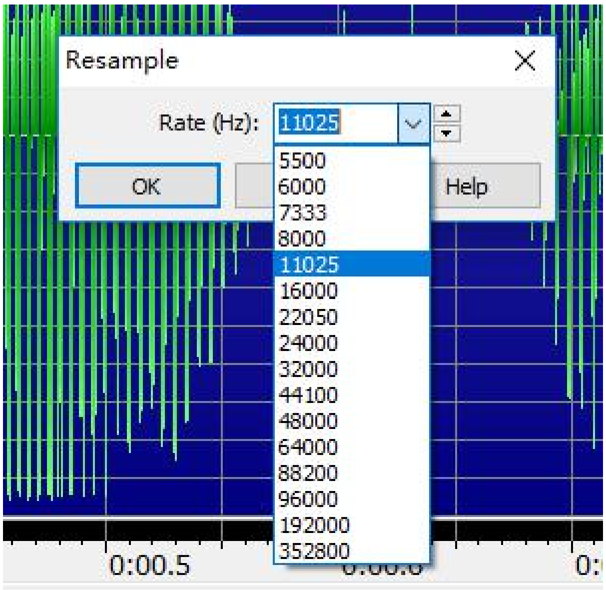
First open an audio file.



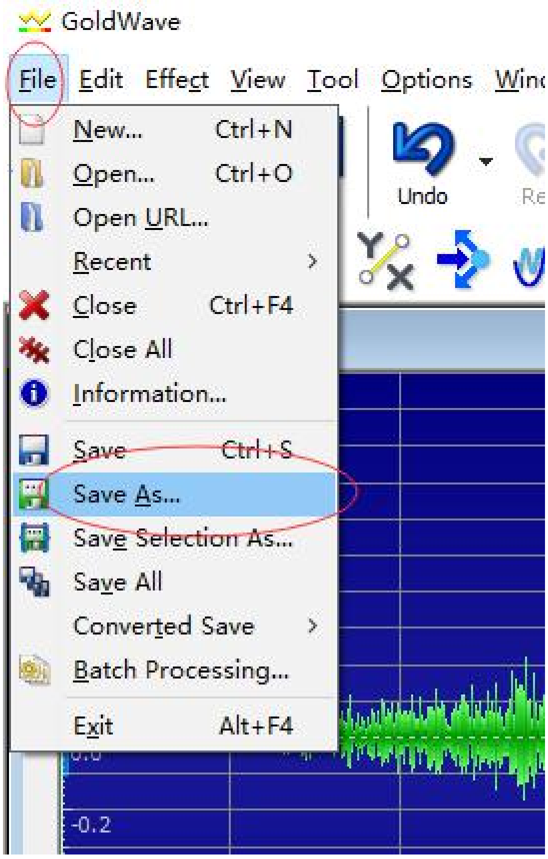
First modify the sampling rate, click Effect-> Resample. As shown below:



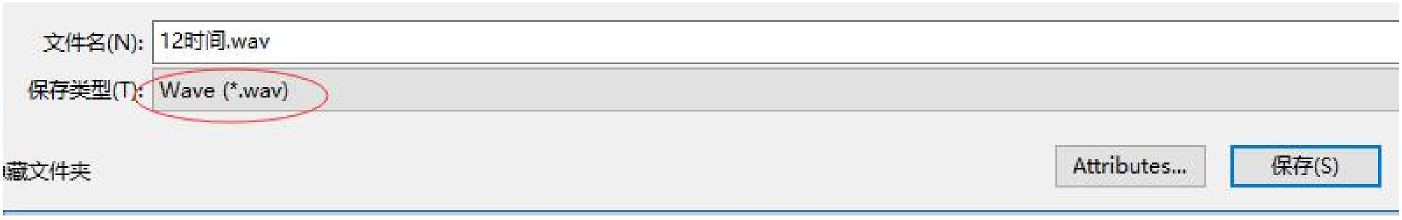
Then select the sampling rate in the pop-up dialog box, the maximum sampling rate supported by the microcontroller is 16000. After selecting, click ok.



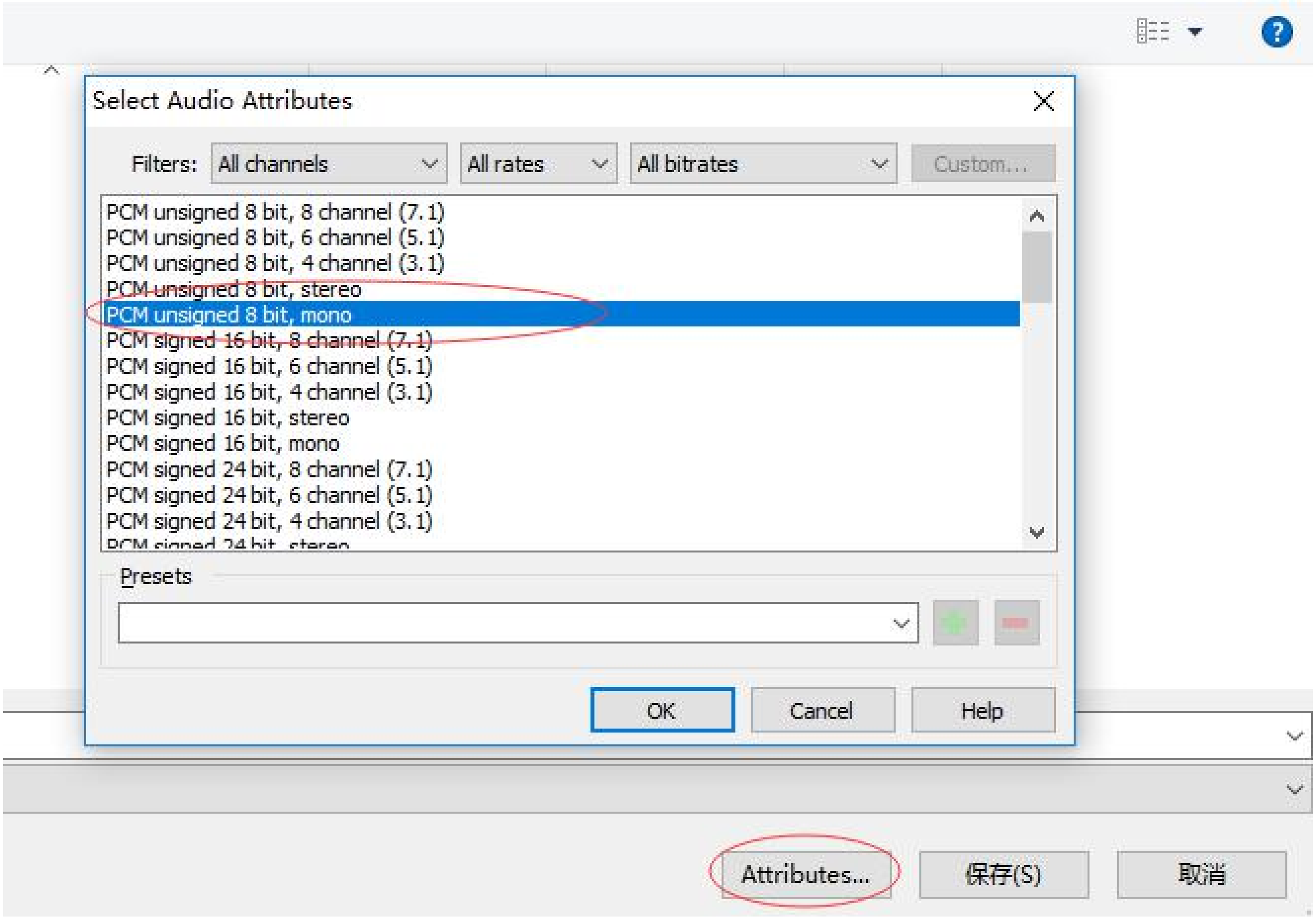
Then select File-> Save as



In the pop-up dialog box, select the saved file type as wav.



Click Attributes and select PCM unsigned 8bit, mono. Finally click OK and save.



2. Download ringtones

(1), connect to the computer

Press and hold the mode key of the clock and connect the clock to the computer with a USB cable. The clock will display a001, and the computer will recognize the clock as a USB flash drive. The following figure shows:





After clicking, there are 3 folders:



Among them, folder 01 is a file of Chinese voice, folder 02 is a file of English voice, and folder 03 is a ringtone file.

Some computers will prompt you to format the U disk. At this time, you should format it according to the steps of putting the ringtone back in the clock, and then download the sound from the network disk into the clock.

(2), increase or decrease ringtone

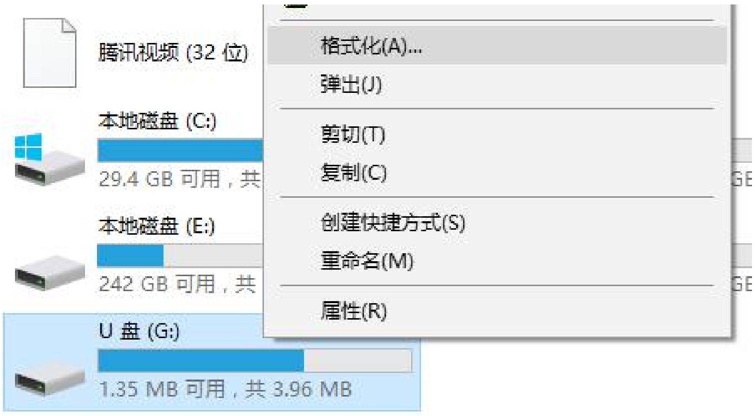
Then copy all the folders to the computer and complete the increase and decrease of the ringtone file on the computer. The contents of the 01 and 02 folders cannot be changed. If the changes may cause a time error, they can only be increased or decreased in the 03 folder Ringtone. There must be at least two ringtones in the 03 folder or the clock will report an error. The first two names of the ringtone file must be numbers, and they must be named sequentially from 00, and the file name length should preferably not exceed 8 characters (a Chinese character is Two characters). The total size of all files after the increase or decrease cannot exceed the capacity of the U disk, otherwise it cannot be put in. As shown in the following figure:



(3), ring back to the clock

After the ringtone is modified, you can put the sound back in the clock.

First format the USB drive, right-click the USB drive, and select Format.



In the dialog box that pops up, select the default configuration size, and finally start, and wait for the formatting to complete.



After formatting is completed, it will become an empty U disk. Then just put all the sound files just copied out together with the folder back into the U disk.

(4), Restart the clock

Finally, power on the clock again.

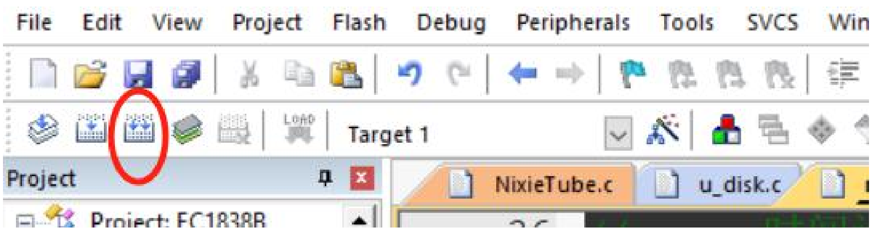
VII, firmware upgrade

This kit provides a firmware upgrade function, which can still improve and upgrade the clock function after it is in the hands of players.It provides source code, and players can also modify the clock function by themselves.

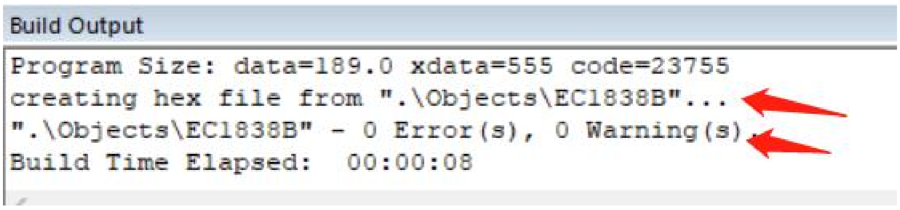
1、Compiler

Note: It is not recommended for people without MCU development experience to do this, because if the program is messy, it will cause the system to run abnormally, and it may be necessary to return to the factory to re-program the program. We also do not provide programming guidance, because programming is a complicated System engineering, we have limited manpower and do not have the time and energy to do this work. Please modify the program yourself strictly according to the program framework, and then modify the program after reading the program flow.

First of all, the Keil version used for compiling the software is KeilC51V9.00. Just open the program and compile it directly (the gift program is already compiled, if you do not modify the program, you don't need to compile again). Those who understand programming can modify the program themselves and add The functions you want really become a unique DIY kit.



If the compilation is successful, the prompt shown below will appear:



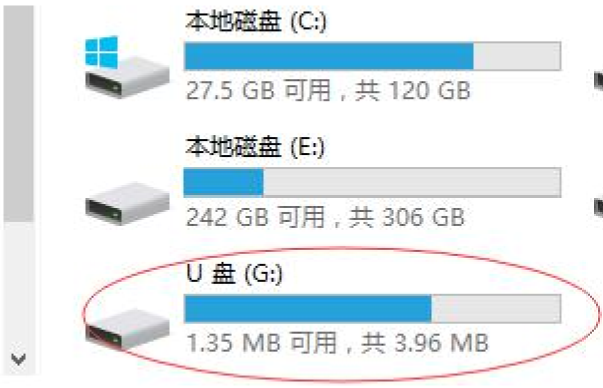
You will find the required firmware EC1838B.hex in the Objects folder.

And pay attention to the size of the program, the value of code should be less than 25600, and the upgrade will fail!

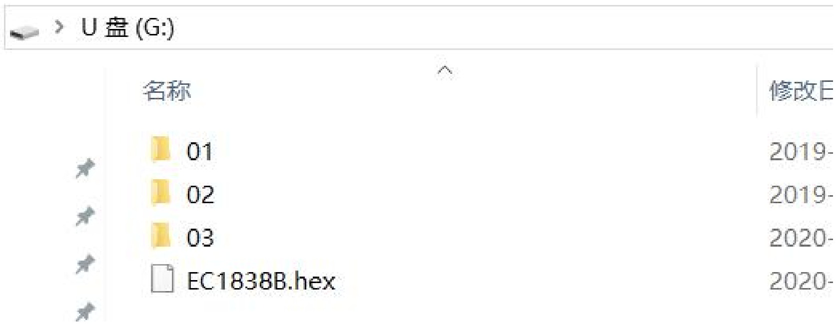
2、Firmware upgrade

Press and hold the mode key of the clock and connect the clock to the computer with a USB cable. The clock will display a001, and the computer will recognize the clock as a USB flash drive. The following figure shows:





After clicking it, there are 3 folders, and then put the clock firmware into the root directory of the U disk, but not in the folder. The file name of the firmware is EC1838B.hex. As shown in the following figure:



Then power on the clock again, the clock flashes and displays the following figure, indicating that the upgrade is in progress, and the program will automatically run after the upgrade is completed.


10
2
9
3